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A MANUAL

OF THE

Cultivation of the Grasses

AND

FORAGE PLANTS

AT THE SOUTH.

SECOND EDITION, REVISED AND ENLARGED.

BY

C. W. HOWARD.

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PREFACE.

The rapid exhaustion of the first edition of two thousand copies of this little manual has emboldened me to offer another edition, revised and enlarged. It has been bought by farmers and others in all the Southern States, from Virginia to Texas inclusive. One business firm in North Carolina has already distributed one hundred copies of the former edition gratuitously among its customers, and has ordered in advance five hundred copies of this edition for the same purpose.

Such results are gratifying to me in a double sense. First, as indicating a kindly appreciation of my humble efforts. Second, as offering evidence of an increased attention in the South to a diversified agriculture.

The conviction is daily strengthening in my mind that we shall not attain agricultural prosperity until exclusive cotton culture is abandoned, and we learn to make a large proportion of our soil productive without labor. This result can be accomplished only by the culture of the grasses, whether native or artificial. In hope of aiding in this "consummation devoutly to be wished for," this second edition is issued.

C. W. HOWARD.

SPRING BANK, NEAR KINGSTON, GA.

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CULTIVATION

OF THE

GRASSES AND FORAGE PLANTS

AT THE SOUTH.*

This manual has been written at the request of a number of persons to whom the subject of which it treats is practically new, and who are without experience in regard to it. This class of persons say that the usual articles written in books, or in agricultural papers, by those who understand the subject, are too general, taking too much for granted as to the knowledge of those whom the articles are designed to benefit. They desire instruction as to the minutest details. This minute instruction the writer will attempt to afford. He begs that the purpose of this manual will be borne in mind by those who are familiar with grass culture, and who might otherwise think the attention to details unnecessary and wearisome. It is written not for the informed, but the uninformed reader.

The ignorance referred to should really not occasion surprise, although occurring among intelligent men. The present race of planters has grown up in a condition of things which looked to cotton as the sole market crop. The deadliest enemy of cotton is grass. They have therefore been accustomed to regard it as a pest, to be extirpated with slave labor. It was so easy and pleasant to make money that the cotton planter did not care to inquire how the rest of the world were managing their lands. As he commanded his own labor, which was movable at his pleasure, and as lands were cheap, it was not material if he exhausted the soil. It was a very easy matter to buy and clear more lands, for which sometimes the first cotton crop paid.

But things are very different now. He has no money with which to buy new land. If he had the money to buy it, he could not pay hands to clear it. And if he could pay them, the work of clearing is too heavy for the indolent free negro. It is almost impossible to induce him to split a rail.

The planter's land, which is now his only capital, is worn. Only in exceptional cases has it been found profitable to make cotton with hired negro labor. This compels him to inquire into some other method than exclusive cotton planting, by which to turn his land to valuable account. As a result of this inquiry, he finds in agricultural books and papers much said about the cultivation of the grasses —that great attention is paid to them in countries in which agriculture most flourishes, and to his amazement he learns that the hay crop even of this country alone, exceeds the value of the cotton crop by some fifty or sixty millions of dollars. He therefore desires naturally to be informed as to this crop, and all the details of its management. It is proper that we should fully discuss in the first place, as a preliminary,

THE IMPORTANCE OF THE SUBJECT.

In the plantation States, land to a great extent is almost unsaleable, or saleable at a very low price. In some cases this low price is due to the effects of the war. For instance the rice lands which before the war commanded from $150 to $300 per acre, are now comparatively valueless. The same result has followed in the case of the rich Mississippi bottom lands, which were worth $40 to $50 per acre.

These high prices of lands were exceptional instances. Before the war, the average value of lands was very low. In the State of Georgia, with which the writer is most famil-

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iar, the highest average of land in any one county was $10 per acre, while the lowest was less than one dollar per acre. The average of Georgia probably quite equalled that of any other cotton State. The good cotton lands of southwestern Georgia were worth from $10 to$30per acre. Now, they would not command one-half that price. It is a significant fact, that the rich lands in upper Georgia, in which a mixed husbandry prevails, have rather increased than decreased since the war in value. Let the fact be pondered that the *depression in price has occurred only in lands devoted to exclusive cotton and rice culture, both of which require a large amount of labor.*

A planter owning one thousand acres of fair average land in the healthy portion of the cotton States is a poor man. He could not sell his land probably for more than $5,000. He looks to the North and finds land ranging from $50 to $200 per acre. He looks to England, Holland or Belgium, and finds it averaging from $300 to $500 per acre. Why this difference? Is the land in these countries better than ours? Not by nature—if it be better it is by the difference in treatment. Is their climate better than ours? The acknowledged superiority is on our side. Are the prices of their products any better than ours? On an average not so good. Are their taxes lighter than ours? If we were compelled to pay their tax, either at the North or in England, our land would at once be sold for taxes. Have they valuable crops which they can raise, and which we cannot raise? There is not a farm product in either Old or New England which we cannot raise in equal perfection at the South. Is their labor cheaper than ours? The cost of labor at the North nearly doubles the cost of labor at the South. In England labor is cheaper than with us. But the difference is perhaps compensated by the poor and church rates, and other excessive taxes paid by the English farmer.

If then our climate is as good as that of the countries referred to, if our land is as good as theirs, if our products bring as good prices, if our taxes are much lighter, if we can grow all the crops that they grow, if labor is cheaper with us than it is at the North, and if difference in taxes compensates for the cheapness of labor in England, why is it that their land is so valuable and ours so valueless?

We shall find the map of use to us in answering this question. If we take the map of the United States, and put our finger upon the States or parts of States in which land sells at the highest price, we shall find that in those States or parts of States the greatest attention is paid to the cultivation of the grasses and forage plants. If we open the map of Europe we shall find the same rule holds good. The cheapest lands in Europe are those of Spain, where little attention is paid to the grasses. The value of land rises exactly in proportion to the attention which is given to them, in England and Holland reaching sometimes for farming purposes to $1,000 per acre. Holland is almost a continuous meadow. This land value culminates in Lombardy, where irrigated meadow lands *rent* for $60 to $100 per acre. Without exception. in Europe and America, where a large portion of land is in grass or forage crops, the price of land is high, reaching the figures above mentioned. On the other hand, without exception, wherever in either continent the grasses do not receive this attention, landed estate is comparatively of low value. Now, when in the investigation of the cause of a given effect, we find in a number of instances in which the result occurs, the presence uniformly of a particular agent, and in a number of similar instances in which the result does not occur, we find this agent to be absent; then unless good reason to the contrary be given, we are at liberty to attribute the result to the presence of this agent. The conclusion is irresistible that a large attention to the cultivated grasses is essential not only to improved agriculture, but also to a high value of landed estate. If there be a flaw in this reasoning, the writer has been unable to detect it. Fifteen years ago this solution was offered of the apparently anomalous condition of our lands, so favored as to all the elements of agriculture, and yet so ruinously low in saleable value. Time has but strengthened the conviction of its correctness. The argument is strengthened by the consideration that extended grass culture in any country is an index of the existence of an improved agriculture. Where this occurs, there must be large numbers of horses or mules, sheep and cattle. These produce an abundance of manure. Where there is an abundance of manure there will be large crops. Where there are large crops land will be valuable. These results follow from the grass crop as the first cause.

If a farm of one thousand acres in the healthy portion of the cotton belt were placed in the condition of an English farm, as to the quantity of meadow and pasture of the cultivated grasses, and which would now sell for not more than $5,000, it would become intrinsically worth $100 per acre. At a low estimate it would afford annually a net yield of $10 per acre, or $10,000. This is ten per cent. on $100,000. The owner would be very foolish to sell a property yielding this income for that price. The difference between the present and practicable condition of the same farm of one thousand acres is the difference to the owner between $5,000 and $100,000

But it may be asked, would it not cost the $100 per acre to bring this farm np to this estimated value? By no means. It is true that the land must be made rich by manure, and that this manure costs heavily. But it may be applied to cotton or wheat, and the expense of

the manure be thus defrayed. The same manure will answer for the following grass—so that the actual cost is only the grass seed, which is comparatively trifling. This result as to a whole farm, with our present limited means, cannot be accomplished at once. But it may be done field by field. If we have one hundred acres in cotton or wheat, give it such a manuring as will produce a maximum crop, and leave a surplus of fertility in the soil. This may be held there and made the basis of a steadily-increasing fertility by putting the land in clover or grass. This process may be annually repeated with different fields until the amelioration has included the whole farm. A homeopathic dose of manure in the drill or hill may favorably affect the growing crop. But this is not a process of renovation which adds value to land. To accomplish this result, the whole field must be made rich, and afterward kept increasingly rich by a judicious rotation of which clover or grass is an indispensable constituent.

The inquirer desires to know how putting a large portion of a farm into clover or grass adds so much to its value. Why would not cotton or corn answer the same purpose?

The great advantage of investing money in banking or other secure stocks is that we get our dividends without labor on our part. We can get that dividend while we are giving our attention to something else. Property is valuable in proportion to its security and the smallness of the cost and trouble of managing it. If we cultivate cotton or corn largely, we must hire hands and buy mules, corn, hay, bacon, and pay blacksmith's bills. If at the end of the year these expenses overrun the sales, then the land has been worth worse than nothing to us. And if this process was to be repeated it would be wise in us to give it away. If there should be a small profit after all our expense and trouble, then the land has a small value to us, to be determined by our net receipt from it. But if we put down the same piece of land in grass, this is done for a term of years. If this land yields only a ton of hay to the acre, and if its saleable value be only $20 per ton, and expenses $5, we have a net profit of $15 per acre, which is ten per cent. on $150, the actual value of the land to the owner. The only labor in this case is the cutting, curing and baling the hay. With a horse-mower, tedder, rake and hay lifter, this expense is not more than two dollars per ton.

On a Belgian farm of one hundred acres, every acre of which yields an income, the steady force is not more than two hands—extra labor being required at grain and hay harvest. The Belgian or English farm of one thousand acres, under cultivation, would require twenty hands. The cotton plantation of one thousand acres with the usual proportion of cotton and corn would require sixty hands, being an excess of forty hands. In addition, in the one instance, capital is diminished by exhaustion of the soil—in the other its fertility, and, therefore, its value, is increased.

A Belgian gentleman, who sold his land in Belgium for $500 per acre, and bought river bottom land in Floyd County, Georgia, at $20 per acre, told the writer that he made more on the Belgian farm, valuing it at $500 per acre, under the Belgian system, than he did on the Georgia land at $20 the acre, under the Georgia system of cotton and corn. He even believed that clover and grass would not grow in Georgia, and, therefore, did not attempt the Belgian system, and fell in with the Georgia practice.

What is the difference between the Southern plantation and the Belgian farm? It is this: Two-thirds of the latter yields a handsome return without labor, while not an acre of the former pays a cent without the use of costly labor.

There are hundreds of cotton planters who have abandoned their plantations and entered into commercial business in the cities. There are thousands who would do the same thing if they could sell their lands even for a pittance. Why is this? They cannot endure the vexation and the expensive and unreliable labor of the cotton plantation. They are disgusted with it. It is not the land, or the seasons, or the markets, but the labor which they think it is necessary to use to excess. As a consequence Southern cotton lands, already ruinously cheap, are falling daily in price.

Now, suppose a system were adopted, by which, while all the open land yielded an income, only a third of the present labor was used. This would give power of selection among the blacks; character among them would become valuable. The quality of the diminished labor which the planter would still be compelled to use would be improved. But the great point gained would be that by far the larger portion of the land would give an annual return, with scarcely an appreciable amount of labor.

Any sensible person can see at once what the effect of this change would be upon the value and price of land. Men who have been worn down by the anxiety of commercial life, often think of retiring in the decline of their years to the country. What sane man would think of retiring to a cotton plantation, to be burdened with the care of a great gang of negroes? It would be retirement with a vengeance. On the other hand, to the wearied business man there is something charming in the thought of broad acres, a few select laborers, green grass, cool shades, running water, thrifty live stock, and all the abundance of the farm. If there be poetry in this there is also very pleasant and solid prose. A small, well manured and well cultivated area of land in

cotton and the cereals, with a large proportion in forage plants and grasses, would give to the cotton planter a pleasure in his business and an amount of real profit which he has never before known.

But this subject has been sufficiently considered. The importance of grass culture has been proved by reference to the fact, that landed estate in Europe and America sells high or low in proportion to the attention given to the cultivated grasses, the human pulse not being a surer indication of the condition of the human body. And by these grasses we are enabled to use profitably our land with comparatively little care and anxiety on our part, and the employment of little of our present expensive and unreliable labor.

The following condensed statement of the value of the grass and hay crop, extracted from the Hay, Straw and Grain Reporter, will be read with interest.

THE GREATEST CROP IN THE WORLD.

A question widely discussed involves the relative value of the wheat, cotton, tea, and hay crops of the world. Which of these products employ the greatest amount of the world's capital? It is said that hay leads the rest, and the items that enter into the account as stated are somewhat startling, and will make a Granger's hair stand on end. Cotton and tea are local crops, while hay is produced everywhere the world over, and thus the hay crop greatly out-weighs either of the other two. The aggregate reported value of all farm products in the United States for 1870 was $2,447,538,658; but as this includes additions to stock, "betterments," etc., it is probably too high. Now the hay crop for that year—that is the grass dried and cured for use or sold—is reported at over twenty-seven million tons. This, at half the selling price in the large cities, would amount to $405,000,000, and is far greater than the aggregate home value of the cotton crop or any other crop. But the cured "hay" is but a portion of the grass crop. The other portion is used on the ground, and it requires considerable calculation to get at the value so used, even in the roughest way. In the first place, live stock, including horned cattle, horses, sheep swine, etc., to the value of $1,525,000,000 were fed from it that year. Averaging the lives of these at five years, we have one-fifth of that sum as representing the grass fed to them in 1870, viz: $305,000,000; next we find the value of the animals slaughtered for food in that year to be $309,000,000, and as this is an annual product, the whole of it will for the present be credited to the grass crop; next we find that the butter crop of 1870 was five hundred and fourteen millions pounds, which at the low average of twenty-five cents, amounts to $128,000,000, and this goes to the credit of grass; next we have two hundred and thirty-five million gallons of milk, which averaged at the low estimate of ten cents per gallon, adds $25,000,000 more to the credit of the grass crop; then we have one hundred million pounds of wool at twenty-five cents per pound, adding $25,000,000 more; and, finally, fifty-three million pounds of cheese at ten cents, adding over $5,000,000 to the total credits to the grass crop of 1870, which aggregates $887,000,000. Now, let us add the value of the "hay" crop as given above—viz: $405,000,000—and we have a grand total for "hay" and the products of grass consumed on the ground amounting to $1,292,000,000! This is, of course, subject to deduction, as the meat, butter, milk, cheese and wool-producing animals consume other food besides grass and hay. To make ample allowance for this, we deduct the entire value of the corn and oat crops of 1870, estimated at $270,000,000, and this leaves a remainder of $1,082,000,000 to be credited to the hay and grass crop of that year, when the reported aggregate of all farm products was $2,447,528,658. If our estimates make even the roughest approach to accuracy, the value of that crop was two-fifths of the aggregate value of all farm products, and hence we may infer that two-fifths of the capital then invested in agricultural pursuits was devoted to the grass crop, and this in the United States equals (in round numbers) $4,575,000,000.—*Hay, Straw and Grain Reporter.*

It is proper now to consider another important question.

WILL THE CULTIVATED GRASSES AND FORAGE PLANTS GROW AT THE SOUTH?

There are some portions of the South, as is the case in all countries, where the valuable grasses will not grow. These are those portions which have been exhausted by long-continued and exhausting cultivation, which are naturally poor, or which contain an excessive quantity of sand.

If, however, it is meant to inquire whether the climate of the South will prevent the successful growth of valuable grasses, the answer is given unhesitatingly in the negative. Perhaps the only climate which is superior to ours in this particular is that of England and Ireland, and others similarly situated. Theirs is a dripping climate all the year round, and the winters are so mild that the grass is green the whole year, so that winter and summer the farmer has the advantage of grazing.

But as compared with the Northern States of this country, the climate of the South is certainly better adapted to grass culture, if we take into consideration the whole year. At the North, during the whole winter and late in the spring, the ground is hard frozen or covered with snow. Of course, during that period the grass is useless, and this constitutes a large portion of the year.

The heats and dry weather of the summer are the drawbacks to grass culture at the South. But these affect summer pastures alone. They do not affect the hay crop. This is an important consideration. Clover and the hay grasses are cut before dry weather sets in. The hay crop at the South will not be injured one year in twenty by dry weather in the spring. We do not know a country more favored in this particular. In England, while the grass grows luxuriantly in the Spring, it is very uncertain whether there will be enough dry weather at the proper time to save the hay. Hence the preparation for hay harvest in England are made with a degree of care and anxiety to which we are strangers. If the occasional sunshine be not used to the utmost advantage, the crop is lost. We, on the contrary, always have rain enough in the Spring to mature the grass, and not enough rain to render the hay harvest at all precarious.

But it may be asked, when the hay is cut, will not the July and August suns afterward kill the grass? There is danger of this result if live stock are turned upon the meadow as soon as the hay is hauled out, and the grass that is left is grazed close to the ground. *A meadow at the South should never be grazed during the summer.* The grass ordinarily springs rapidly after it is cut, and thus covers the ground and protects the roots from the intense heat of the sun. This precaution should never be forgotton by those who hope to raise hay successfully at the South.

But after the Fall rains set in and cool weather begins, the meadows may be moderately grazed in dry, but never in wet, weather. With some grasses this grazing may be continued during all the dry weather of the winter, as they continue green.

This winter grazing is the great advantage of the South. It more than compensates for the drought and heat of summer. It saves to a considerable extent the cost of cutting and curing hay, and of the construction of expensive barns. While cattle and sheep at the North are shut up in great stone barns, costing thousands of dollars, for six or eight months of the year, requiring costly feed and attention, the same animals during the same period at the South might, on winter pastures, be kept in equally good condition without any other expense than their salt and the interest on the land upon which they graze. This is not mere theory. The writer has sold fat Ayrshire cattle, fat enough to have been approved in Scotland, which never had tasted a mouthful of food, winter or summer, save that which they gathered for themselves. The reasonable conclusion is that the Southern climate, if we consider the whole year, is well adapted to the successful cultivation of valuable forage plants and grasses.

Now as to soil. Poor land in no country will raise rich grass. But there is a difference, other things being equal, in the natural adaptation of soils to grass. Sandy soils are unfavorable to it. This want of natural adaptation may, however, be compensated by extra pains in preparation and manuring. Tight clay soils are, at the South, best adapted to grass. Wherever such a soil is either naturally or artificially rich, grass will thrive in it. Some of these soils are unsuited to any other crop from their compactness, unless it be oats. For instance, what are called "pipe-clay lands," these will bring neither cotton nor corn to advantage, but will produce excellent herdsgrass. There are thousands and tens of thousands of acres of this pipe-clay land, now utterly valueless to their owners, which would make fine herdsgrass meadows.

Success in grass culture is simply a question of food for the plant. It must be the food which the plant requires. If a horse has ever so much meat near him and nothing else, he will starve. If a dog has a hay-stack within his reach and nothing else, he also will starve. Plants have their likes and dislikes in the way of food as decidedly as animals. Land may bring a bag of cotton to the acre, and yet be poor grass land. On the contrary, land may be well adapted to grass, which is unsuited for cotton. Lands, in their virgin state, abounding in the salts useful in general agriculture almost to excess, will produce a great variety of crops. From this virgin affluence plants have an opportunity of selecting their appropriate food. But when these salts have been consumed or washed away, when we plant a crop of any kind we must put back the specialty in the way of food which is required by that particular crop. Therefore, if we wish to sow clover on land which has been deprived of phosphate of lime and potash we must replace them. If we wish to sow grass, we must replace ammonia and potash. Perhaps the following general rule will prove an useful guide: Any land that will bring good wheat will bring good clover, and any land that will bring good oats, will bring good grass.

The writer has seen the various useful forage plants and grasses tried from the mountains to the coast of Georgia. He has been closely observing in regard to this important interest for more than twenty years. As a conclusion of this protracted observation, he does not hesitate to say if ground be made sufficiently rich and as well prepared, that if judgment be exercised in sowing and in adaptation of species to particular locality, and proper subsequent management be observed, that so far as soil and climate be concerned, the South has unusual fitness for successful cultivation of the valuable grasses.

DRAWBACKS.

The grass grown at the South will have some difficulties to contend with. But none

so formidable as those which are incident to cotton and wheat. One of these difficulties, the heat of the summer's sun, has already been noticed, and also the mode of removing it. In this connection there is an additional consideration. We have really comparatively little need of artificial summer pastures. Broomsedge makes excellent spring pastures, and the crab-grass in the stubble gives a summer pasture which cannot be surpassed. This is a point of superiority of the South over the North. The Northern farmer has nothing to correspond with our crab-grass. His stock are eating without appetite or relish in August and September the old grass of the spring, while our stock are luxuriating on the fresh bite of the newly-sprung crab-grass.

We are fortunately exempt in our pastures and meadows to a great degree from perennial weeds. The two most troublesome are the dock and the thorn-apple, or "tread soft," as it is called in the vernacular. The former must be dug up by the roots, the latter may be killed in either of two ways; it will be destroyed by repeated mowing, or if sheep are turned into the pasture when the berries are green they will eat them with avidity. In two seasons the plant will die when thus treated. But if either sheep or cattle are turned into the meadow or pasture when the seeds of this pest are ripe, they will eat them and scatter them over the farm. The cow-itch and the China briar are easily destroyed by cutting with a scythe as often during the season as the leaves put out. The leaves are the lungs of plants, and if they cannot breathe they die. Blackberries and sassafras may be destroyed in the same way, that is, by repeated cutting. This work, however, requires the attention of the owner. If a negro is sent to cut down either briar or sassafras, and if he leaves only a leaf or shrub on the stock he might as well not have cut it at all. But it is best to destroy these troublesome plants before grass is sown. For this purpose a flock of sheep is very effective. In a single season, if kept hungry in a short pasture, they will exterminate both briars and sassafras, if they have been previously cut down in the spring. The sheep will render a second cutting unnecessary.

But the greatest enemy to permanent meadows or pastures of the cultivated grasses is broomsedge. Ordinarily before a meadow or pasture is five or six years old, it is overrun with this grass; and the richer the land the ranker is its growth. It is usually considered to be a sign of poverty of soil, but this is because fields at the South are usually turned pastures only when they have become exhausted of the food of valuable crops. It will grow better on the richest bottom than on poor upland.

A precaution against broomsedge is very heavy seeding of the grasses which we desire to occupy the soil. When grass seed is sown it should be thick enough for the plants to occupy the whole ground at once. Wherever there is the smallest vacant place broomsedge will appear. When it has made its appearance if a shovelful of wet or recent manure, or of rotted manure in a powdered state, is thrown upon a tuft of it it will die, and the good grass is benefitted. It will be observed that this pest never grows about a place in which stock have been kept or penned. A meadow or pasture well manured with stable or barn-yard manure will not be troubled with broomsedge for a number of years It is to be presumed that Peruvian guano, or ammonia applied in any form will have the same effect with barn-yard manure. Potash, in the form of ashes, is equally destructive to broomsedge, and beneficial to the valuable grasses. The careful observer will have noticed that in the thickest set old broomsedge field it never grows up to a burned stump, not approaching nearer than a circle of three or four feet. If a flock of sheep are closely penned, using a moveable fence, for ten or twelve nights, on places in a valuable meadow, on which broomsedge has appeared, it will be effectually killed without injury to the good grasses. The treading and the manure combine to effect this result. The presence of broomsedge indicates the absence or deficiency of ammoniacal manures.

In this connection, and as an adjunct of grass farming at the South, it may be well to describe a portable fence, in use by the writer, originated by him, but not patented.

Make a panel of fence eight or ten feet long, of five planks, six inches wide, and three-quarters to one inch high, nailed to three uprights, two by three inches, twenty-five and one-half feet long. The uprights should be sharpened at the lower end, a two inch auger hole should be bored diagonally, and in these, stakes should be inserted. These stakes may be of saplings of any kind, six feet long, sharpened at the lower end, and with a shoulder at the upper end, so that the stakes will project nearly one foot above the plank. The fence will stand at an angle of about forty-five degrees to the ground. If the fence is to stand for a length of time, it would be well to bore a three-quarter auger hole through the stakes above the planks and insert a wooden pin. The corner panels can be made to fit by shortening the planks from the top to the bottom. With a flock of sheep and a movable fence, the farmer can be quite independent of broomsedges in his meadows.

But it may be said that it may pay to manure meadows or hay, but not manure pastures. Certainly not summer pastures. The natural grasses, broomsedge among them, answer very well for that purpose. But it will pay, and pay handsomely, to manure winter pastures, because they are in effect

meadows without the cost of hay making. In the whole range of Southern agriculture there is no crop on which manure pays as well as on winter pastures.

The annual weeds are no serious injury to artificial meadows or pastures. The first year their shade is rather valuable than otherwise; afterward most of them require the ground to be stirred to induce vegetation. Mowing the grass will destroy those which do vegetate by preventing their going to seed.

On the whole the drawbacks to successful grass culture at the South are as few and as easily removable as in any portion of Christendom.

FORAGE PLANTS.

By the term Forage Plants, is meant any plant—not a grain or grass—which is cut and cured for food for the domestic animals. A great variety of these plants are cultivated in different parts of Europe. Most of these are not adapted to the climate of the South. Among them are Chicory, Burnett or Pimpernel, Scabius, Spurry, Lupin,and Sainfoin. Very careful experiments were made with each of these plants. They were tried on upland and lowland, with and without lime, with and without manure. The first seeds were obtained from England. When they failed, seeds were ordered direct from France and Italy. The seeds vegetated in each case, but the plants were not found to be practically useful. Chicory grows at the South with great vigor, but it requires too much labor in cultivation. The experiments with Sainfoin were varied and persistent. It was abandoned with reluctance. It is so valuable in England, and especially in France, in a climate very much like our own, that great results were hoped from it. The Sainfoin grew, but never became tall enough to mow. It is said to flourish in Europe best in sandy, calcareous soils. Possibly it may thrive in what are called rotten limestone lands. It is well worthy of experiment in these soils, as where it thrives well it is placed at the head of forage plants. Its name, "sacred grass," indicates the value which is attached to it.

It is proper to say that all of these experiments were made in the blue limestone lands of northwestern Georgia. In this section we do not hesitate to say that trials of all the above-mentioned plants have been unsuccessful. In view of this failure it is unnecessary to enter into a description of their cultivation and use.

LUCERNE.

As a forage plant at the South, lucerne is very far superior to all others. It is used for two purposes. First, for feeding green or soiling; used in this way, it is best to cut the lucerne a day in advance, so as to feed it in a wilted state. *It must never be pastured.* Live stock pasturing it, bite out the crowns of the plants and kill them. When fed green, it may be given to horses, cattle and hogs. Horses fed upon it when not at work need no grain—when at work one good feed of grain a day is sufficient. Hogs will keep in good order on green lucerne cut and thrown to them.

Lucerne hay is extremely nutritious, and is relished by horses, cattle and sheep. So far as the observation of the writer extends, it is preferred by the domestic animals to any other kind of hay.

The product of lucerne is enormous. Five tons of excellent hay may be cut from one acre of ground planted in lucerne. It is estimated that fodder, green and dry, may be obtained from an acre of lucerne for the support of five horses during the entire year—this includes the great bulk of green food during the spring, summer and autumn.

In this latitude lucerne is not green during the months of December, January, and part of February. In the low country it would probably be green all the year. In this section it commences its growth during the latter part of February, and gives its first cutting early in April, even before the wild grass begins to spring. It is ready to cut fully a month in advance of red clover. The rapidity of its growth is excelled only by asparagus.

The root is perennial, lasting ten or fifteen, or perhaps more years. These roots become as large as small-sized carrots. Five acres of lucerne on this farm were destroyed during the war by being grazed by Sherman's horses and cattle. After that, the ground was left riddled with holes, giving it the appearance of a locust year. The succeeding crop of corn was very heavy. This might have been expected in view of the fact stated by Ville, that lucerne absorbs more ammonia from the atmosphere than any other plant whatsoever. This is a point, however, of little practical utility, as no one having a field of lucerne would plough it up for any other crop. Great care must be taken in saving lucerne hay. If it is too much exposed to a hot sun, the leaves crumble and fall off. The prevention is to put the lucerne cut in the morning into small cocks in the afternoon, open them for a little while the next morning after the dew is off, and haul immediately to the barn. These cocks should be not more than six feet tall, and as small round as can be made to stand. The hay is cured as it were in the shade, the wind or air circulating through the cocks.

Whenever lucerne turns yellow, it should be mowed, no matter if it has not attained its full height. The yellow color is an evidence of disease, or the ravages of some small insect. Lucerne should be cut as soon as it is in blossom, after this the stems become hard and woody. It does not reach perfection until the third year. The yield is, however, heavy

the first year as compared with other forage plants.

Notwithstanding all precautions, some weeds and crab-grass will appear the first year. These must be repeatedly mowed, so as to prevent their going to seed. If they are annuals they will give you no trouble after the first year.

The ground designed for lucerne should be made as clean as possible. In its first year it is delicate, and in very rich ground is liable to be smothered by weeds, and especially crab-grass. All perennial weeds, as dock, plantain, thorn-apple—or in the vernacular, "Tread soft"—should be carefully exterminated. Either Bermuda or blue grass, or in fact any stoloniferous perennial grass would be very hurtful to it. In view of this necessity, a cleansing crop should precede it, as cotton or turnips, fed on the ground by sheep.

As the taproots of lucerne penetrate to a great depth, the soil should be ploughed to a great depth. A heavy two-horse plough should be followed by a two-horse subsoil plough. It would be well to cross-plough the same way. The surface should then be repeatedly harrowed until it is perfectly free from lumps.

Lucerne seems to be indifferent to the texture of the soil, provided it be dry and sufficiently rich. The writer has seen it grow with luxuriance on the sands of the seaboard, and the clay of the blue lime-stone country. But two things are required, the soil must be dry and rich.

Too much pains cannot be taken with ground to be sown in lucerne, as to cleanness, fertility and depth of ploughing. It would be best for any one who does not design to take these pains, to let it alone. On land of ordinary fertility and cleanness, lucerne would be very profitless.

If barn-yard manure be used, it should be perfectly rotted so as to contain no seeds of weeds. If it be not rotted, it is best to use one of the commercial manures. One should be selected which contains a small amount of ammonia, and a large percentage of phosphate and potash. One thousand pounds of this manure to an acre would not be at all too much. This should be thoroughly harrowed in before the seed is sown. A top dressing should be given every third year.

Whether the seed should be sown broadcast or in drill, depends on the condition of the ground as to cleanness. If the ground be perfectly clean, broadcast sowing is the cheapest and best. If the ground in two or three years becomes hard on the surface, it can be harrowed when the top dressing is applied.

If the ground be foul, the seed should be sown in drills, about twelve inches apart. A coulter or very narrow scooter-plough can be run between the rows as often as may seem necessary.

About ten pounds of seed should be sown to the acre. This seed now sells in New York at fifty cents per pound, making the cost of seed for an acre five dollars. In large quantity it can probably be bought at a cheaper rate. When sowed, the seed should be brushed in, or rolled. The covering should be very light, in fact if the seed be sown before a rain or during a drizzle, no covering is necessary.

Here it may be proper to remark in connection with the sowing of all small seeds, whether of forage plants or grasses, that if they are covered an inch deep, vegetation is doubtful, and if a clod is turned over upon them they will not vegetate at all. The seedsman is often blamed when the fault is in too deep covering by the farmer.

It may be said that the process of preparation of land for lucerne is very expensive. That is true. But let us compare this expense and the results. Suppose an acre of land to be worth $10, and the cost of ploughing, harrowing, manure and seed be $40, in all $50 Five tons of lucerne hay, if it be sold at $20 per ton, is $100, a very good interest on $50. In most localities where there is a market for hay, lucerne would command upwards of $30 per ton. It should also be remembered that the results of the expenditure last for a term of years, and not for one year, as in the case of corn or cotton or grain crops.

Great efforts have been made to introduce lucerne into England. Large premiums for a series of years have been offered by the Royal Agricultural Society. But the soil or climate, or both, are unsuited to it.

Efforts have been made to introduce it in the Northern States of this country, but also without success. The winters are too severe.

Lucerne is a child of the sun. It is a plant of a warm climate. Its long taproots render it comparatively insensible to drought. It grows as well at the South as it does in France or Italy. Yet it may be doubted if there are ten acres of lucerne on any one farm at the South. While we have a plant which yields hay of a better quality and double in quantity, as compared with any grass grown at the North, our railroads are groaning under the weight of Northern hay.

In our present condition it can hardly be expected that farmers will lay down much land in lucerne, on account of its expense, unless it be where there is a ready market for hay. But every farmer should have an acre or more of lucerne near his stable, according to the number of his horses. In no other way can he provide for them a fodder so cheap and nutritious. The practice is growing among persons living in our villages, to have

a clover lot to provide hay, or cut green food for their cows and horses. Such persons will find lucerne to be much more valuable than clover, both as to quantity and quality of the food produced.

Much space has been devoted to this plant because it is so little known among our farmers, and because its cultivation would be of such great benefit to them.

INDIAN CORN.

Corn is spoken of not as a grain. Nor in reference to its fodder pulled in the ordinary way. Few farmers understand the actual cost of fodder pulling It will appear when they send a gang of hands into a one hundred acre field to pull fodder, every blade of every stalk must be manipulated or handled. Contrast this tedious, toilsome, costly process with saving a crop of hay by improved machinery, by aid of which the grass is not touched by human hands from the cutting to the loading into the barn.

Strictly as a forage plant corn possesses a great value. It may be ranked next to lucerne, which it exceeds in quantity, but does not equal in quality. Ten tons of cured fodder may be procured from an acre of land.

To obtain a full crop, the soil should be heavily manured, and ploughed very deep. The rows should be three feet apart, and the corn sowed at the rate of three bushels to the acre. One ploughing and hoeing is generally sufficient. The corn should be cut when it is in tassel. If the weather be good it may lay upon the ground twenty-four hours. Stalks should have been left standing at such distances that the cut stalks may be piled around them in the shape of a stack. They may be fastened by tying them with a stalk near the top. Rain will not injure them in this position, and in a week or ten days they may be hauled into the barn.

These corn-stalks cut up with a straw-cutter make very good winter forage for horses and cattle, though not so good as hay. Their principal use at the North is for soiling milch cows in the summer. The necessity for this arises from the fact that at that season grass in their pastures is old and dry, and cows fail in their milk on it. This necessity does not exist with us, as at the same season our crab-grass affords a fresh bite. Very sensible farmers at the South have estimated the crab-grass pastures of a fair season on stubble land as being nearly equal in value to the preceding small grain crop.

In the absence of a sufficient supply of hay, it is very proper for the Southern farmer to have some acres in sowed corn. The objection to this practice is that it must be repeated every year. This involves manual labor and expense, whereas a meadow lasts for years, and requires no labor but the harvest. In sowing corn for forage, it is preferable to use Northern or Western seed corn, as the stalks are not as large and hard as the Southern varieties.

THE FIELD PEA.

A variety of the pea for forage purposes should be selected which runs very much to vine. In this respect the varieties of the pea differ materially, some growing in bunches, others in rich land, matting the ground with vines. The peas should be sown in drills three feet apart and worked sufficiently to keep them clean. The vines should be cut when a few of the peas have matured, but when most of the pods are green. A short-bladed scythe should be used in cutting them. They are saved without difficulty by the same process which was recommended in the case of lucerne, only the pea vines should remain a day or two longer in the cock. The amount of valuable winter forage which can be obtained from an acre of rich land in peas is very great. The writer has found the following an easy and efficacious method of saving pea vine hay. Cut pine or other poles, about as long as an ordinary fodder pole, leaving the branches two to three feet long. Sink the pole securely in the ground, and stack the vines when quite green about this pole. The short branches left will secure sufficient ventilation and prevent mildew.

THE VETCH.

There are two general varieties of this plant, the winter and summer vetch. The latter is of very little use to us, as it will not for summer soiling yield as large an amount of green forage as corn. The winter vetch will be found quite useful for soiling purposes very early in the spring. For this use it comes earlier than lucerne, being ready for the first cutting during the first warm spell in February. The seeds should be sown early in August, allowing one bushel to the acre. On well-manured land the vetch, or tare, yields a large amount of early-cut food, or it may be made into nutritious hay.

The English attach much importance to the vetch. But with the single exception of early green food, they are hardly equal to our common field pea.

There is a small vetch or vetchling which is sometimes introduced upon Southern farms with Northern grass seed. On rich land it will grow two to three feet high, blossoms even before blue grass, and is very useful for early pasture. As soon as ripe the pods burst open, and the seeds are scattered. Wherever this plant appears it should be encouraged.

More than twenty-five years ago, the writer observed a very luxuriant bunch of native vetch growing on a plantation wharf on Cooper River, in South Carolina, and directed the attention of the proprietor to it as a valuable plant. But he was a rice planter, and in that day no man among rice or cotton planters

had "two strings to his bow," and the suggestion was unnoticed.

The December number, 1874, of that excellent agricultural journal, the *Rural Carolinian*, contains a suggestive article from Mr A. B. Rose, of Charleston. That gentleman details an experiment, in which he turned under a crop of this native vetch, and with the aid of some lime, and the result on four and a half acres was the production of forty-five bushels of corn to the acre.

The use of this native vetch as a fertilizer is well worthy of consideration and examination in those parts of the South in which the soil is too sandy for the successful growth of red clover.

There is a perennial vetchling, somewhat larger than what is called the partridge pea, which is native in all parts of this State, and which might be made useful by cultivation. This variety grows wild in the woods, and is green all winter. Live stock are very fond of it, and eat it out where they can reach it. Its being perennial is greatly in its favor.

RIBWORT, OR NARROW-LEAVED PLANTAIN.

The seed of this plant is frequently introduced with clover seed. On ordinary uplands it is of little use, except that it is green during the winter, and gives a moderate bite to sheep, which are very fond of it at that season. On rich upland or moist bottom land, it grows quite high enough among the grass to be cut for hay. In Lombardy it is an essential constituent of their best meadows. The narrow leaved should be distinguished from the broad leaved plantain, which is worthless.

THE OAT AS A FORAGE PLANT.

No more valuable winter forage for horses, cattle, and sheep, can be found than oats cut just before the straw begins to turn. The seed will mature, and the straw cut in this state is equal to good hay. Horses will do moderate work upon oats in this state without other food. The oats should be cut with a mowing blade, and cured as hay. They should, of course, be cut up with a cutting-knife before feeding.

The objection to all these annuals as forage plants is quite serious. It is a tax to be compelled to repeat the same process every year, when there are plants equally valuable which last for a term of years. Rather than pull fodder, any one of them should be used, but only until permanent meadows and pastures are laid down.

RED CLOVER.

In the variety of its uses this is the most valuable herbaceous plant to the Southern farmer. Lucerne is superior to it in the quantity and quality of its hay. But, then, lucerne cannot be grazed, nor can it form a part of an ameliorating rotation of crops, and will not thrive except upon land in the highest tilth and of extreme fertility. Red clover, on the other hand, bears grazing admirably, is an ameliorating crop; makes excellent hay and in large quantity, and thrives on land of moderate fertility, such as will produce remunerative crops of wheat or corn.

The doubts as to whether red clover would succeed at the South have been dispelled. There have been fine clover fields from Hutchinson's Island, opposite Savannah, in the middle country, and among the mountains. In no part of this State, or any other of the Southern States, has it finally failed after intelligent and persistent trial upon proper soil. A farmer may have sowed clover and failed. Perhaps he may also have sowed wheat, or planted cotton or corn, and failed. But this does not deter him from sowing or planting again. He knows that he must have made a mistake, or the seasons may have been against him. These failures in clover may be attributed to bad seed, or too deep covering, or to unsuitable soil, or to a very hot and dry season.

This plant is of so great importance to us, that these causes of failure should be carefully investigated and corrected by a different practice in the future. One, or several failures, should not discourage us in a new and important culture. Many persons have succeeded in growing clover in all the different sections of the South. Why not all succeed who have suitable soil?

What is a suitable clover soil? It must contain a large percentage of clay. Our extremely sandy lands on or near the coast will not grow clover successfully. Among them the pea must be the substitute for clover; and an excellent substitute it is, with the exception that it is an annual, and requires some cultivation. The native vetch may also prove useful.

But where the surface is sandy and the subsoil clay, the clay may be brought to the surface and manured; clover will then thrive upon it. Generally a good wheat soil, and every farmer knows what that is, is a good clover soil. The richer the soil, the more rankly will the clover grow. It is time thrown away to sow clover seed on land that will not bring ten or fifteen bushels of wheat to the acre, or its equivalent in other grains.

The subsoil for clover must be dry. It will not thrive on wet lands. But it does thrive on bottom lands thoroughly drained. Hence it has always been the opinion of the writer, that the rice lands on our coast would yield magnificent crops of clover, and be more profitable, all things considered, than rice.

A gallon of clover seed is sufficient for an acre, or a bushel to eight acres. The seed should be lightly covered with a brush or roller, and not with a plough.

The ground for clover should be ploughed as

deeply as possible. The danger to clover arises from our hot suns acting upon the surface of the ground. If the young clover root has a loose bed underneath, it will rapidly penetrate to a sufficient depth to pump up moisture, and thus be measurably independent of drought. The writer has seen excellent clover grown in Morgan County, in this State (Georgia), one of the midland counties, on worn clay soil, the seed sown in April and followed by a dry spring. The preparation was very deep ploughing and dressing the surface with three hundred pounds of superphosphate of lime.

USES OF RED CLOVER.

Hay.—Clover should be cut for hay as soon as a portion of the heads begin to turn brown. Earlier than this it is too watery, later it is too woody. Clover hay may be very useful or very worthless for forage, according to the time at which it is cut, and the manner in which it is cured. Clover cut in the morning should be treated as previously directed for lucerne. The great object is to cure it as much as possible in the shade. The hay, when cut at the proper time and cured in this way, will be of a nice green color, with all the leaves and blossoms attached, instead of the black sticks which are often sold to us as clover hay. Rich land will yield two tons, and sometimes three, of clover hay. At $30 per ton this is $60 to $90 per acre. It is as sure a crop as wheat, cotton or corn. Where there is a market for hay, considering the amount of labor it requires, and the condition in which it leaves the land, it is a more profitable crop at present prices of hay, than either of the three crops above mentioned.

Seed.—The use of clover is extending so rapidly at the South, that it is quite time that we raise our own seed. The present price is enormous as compared with the cost of saving it. The second crop should be reserved for seed. A simple implement, which can be made on any farm, is used for gathering the clover heads, when the seed is ripe. This is a box on wheels running near the ground; in front of it are fingers like those of the cradle, only shorter. The box, to which handles are attached, is made to tilt backward when full. It is drawn by one horse in shafts. The clover huller can be bought in New York for $50. Five to six bushels of clover seed can be grown on an acre. At present prices, $10 in most Southern markets, this would pay very well. There would be material advantage in buying acclimated seed.

Pasture.—No live stock should be turned upon a clover field until the clover is in blossom. The temptation to violate this rule is very great. Ordinarily short as our winters are, the provision for winter forage is scant. Clover springs so early, and our live stock are so hungry, that the inducement is very great to put them upon the clover before the proper time. But it would be less costly to buy food than to do this. By too early pasturing, the clover is killed out, and it is then said that clover will not succeed at the South. Precautions should be taken in turning horses or cattle into a clover field. If they are hungry at the time, they would over-eat themselves, andthe result is an attack of what is called hoven The animal swells, and often in a short time dies. To prevent this, live stock turned into a clover field should previously be fully fed; they should not have had access to salt within twenty-four hours; they should not the first day remain more than half an hour, and the dew should have been dissipated.

While clover gives a valuable pasture for all live stock, it is especially valuable for hogs. If they are put upon clover after it is in blossom, with the exception of sucking sows, they will need little or no other food. No one who has not made the trial, can imagine how many hogs an acre of really good clover will keep in growing order.

It should be remembered that clover, as well as all other forage plants and grasses, should be lightly pastured during midsummer. It is absolutely essential that sufficient growth be left upon the ground to protect the roots from the intense heat of the summer's sun. Our main reliance for pasture at that season should be the crab-gras[illegible]n stubble fields.

An Improver of Land.—It cannot be expected that clover will restore, unassisted, an absolutely exhausted soil. Land must be in a condition to bring fair crops of grain before clover can be sowed upon it to advantage. Afterward in a judicious rotation, it will improve the soil rapidly. It does this in two ways, by the decay of its large taproot, and by its absorbing ammonia rapidly from the atmosphere. The cheapest manure that we can use, after land has been put into proper condition, is clover seed. At the North clover is a biennial; at the South it lasts for several years, exactly how long the writer does not know. After clover has once fairly gone to seed at the South, if a short rotation is adopted, it will not be necessary to sow it again. For instance in the following rotations: First, cotton or corn; second, oats; third, wheat; the clover will spring spontaneously among the wheat. The ground should remain two years in clover and the rotation then be repeated. Land thus treated will improve steadily and even rapidly, without further expenditure for manures.

In view of these varied uses, the successful cultivation of red clover is an object of the greatest importance to the people of the South.

CRIMSON CLOVER.

This is an annual, and is liable to the same objections with all other annuals. It may be sowed with wheat in the fall, and after the wheat is cut, will yield a fair crop of hay, or give good pasture the same season. But in the experience of the writer, it has been found to be inferior to the common red clover.

ALSIKE CLOVER.

This is a perennial plant, spreading, like white clover, from the roots. It appears to be an intermediate between red and white clover. It grows taller than the latter, but not so tall as the former. A *prima facia* consideration against it is that it is a native of Sweden, and could hardly be expected to thrive in a hot climate. Some persons at the South have spoken well of it. The trials of it by the writer have not been satisfactory.

WHITE CLOVER.

This is a very valuable plant at the South. On rich land it will grow tall enough to be cut by itself, which is not the case at the North or in England. Mixed with timothy and herds-grass, it greatly increases the bulk and value of the hay, giving a cutting close to the ground.

It affords excellent pasture in the spring for hogs, sheep, and cattle, and also for horses, until the blossoms fall, when it salivates them. This is also true of the second crop of red clover.

White clover is much valued in England on account of its manurial properties. After it is once firmly set in the soil, whenever it is at rest, the white clover springs up. When a worn soil has become natural to white clover, the process of resuscitation is rapid. An application of ashes will often cause white clover to spring up where it has not been known before. If mixed with red clover two quarts of seed is sufficient, as it spreads both from the seed and root.

MILLET.

Eight varieties of millet exist in this country and have been cultivated. It is used for soiling purposes, for hay, and for its seed. Upward of fifty bushels of seed have been raised to the acre on rich land. The hay made from millet is of good quality and large quantity. For forage purposes, in the opinion of the writer, it is not superior to oats, and is inferior to the winter vetch. It is objectionable as being an annual for reasons previously given.

Other forage plants might have been considered. It is, however, the object of this little manual to call attention only to those which have been practically useful at the South. Further consideration of the subject would, therefore, be rather curious than instructive.

GUINEA GRASS.

The writer has had no opportunity of practical acquaintance with this grass. In fact the name seems to be applied to three entirely different species. Flint applies this name to the Sorghum vulgare. This is generally known as Dhourra corn at the South.

The editor of the *Rural Carolinian* says that the true Guinea Grass is the Panicum jumentorium, which is an annual.

That which is ordinarily termed Guinea Grass, is the Sorghum hala pense, by some persons also called the Means grass. This grass is propagated by underground stems or roots. It has been dreaded by planters, because it seems almost impossible to exterpate it where it has once been established.

A prominent position is given to this grass by its endorsement in the letter of Mr. N. B. Moore, of Augusta, Ga. This gentleman is certainly the highest authority in Southern grass culture. I have before me a communication from Mr. Moore, published in 1834, in the *Southern Planter*, urging the general cultivation of the grasses at the South. Since that time he has steadily devoted himself to grass culture, planting nothing else on his farm of one hundred acres of Savannah river land, near Augusta, Ga. From these one hundred acres he has derived an income of from seven to ten thousand dollars per annum. After persistent and skilful trial of the different grasses, his preference of Guinea grass will occasion much surprise. The difficulty of eradicating the Guinea grass, is with him an advantage. This would be a very serious objection where the meadow was not designed to be permanent. It does not appear to spread. The letter of Mr. Moore will be read with great interest by persons engaged in grass culture.

AUGUSTA, September 7, 1874.

DEAR SIR: Yours of the 5th instant is before me. In answer to your questions I would say, that after an experience of upwards of forty years in cultivating grasses, of almost every variety described in your "Manual of the Grasses," I now prefer the Guinea grass. It is perennial, is as nutritious as any other; when once well set, is difficult to eradicate; will grow on ordinary land and yields abundantly.

My meadow consists of one hundred acres of alluvial land, near Augusta. Before emancipation it received annually, for twelve years, an average of five hundred cords of stable manure, hauled from town, besides wood ashes in large quantity. For the past seven years, I have been top dressing with commercial fertilizers, preferring Ober & Son's double A. A., Baltimore, to any other.

In winter I employ but four men, who are enough to work my packing press; in sum-

mer, when harvesting, double that number. In the autumn, I usually scarify both ways with sharp, steel-toothed harrows, and sow over the stubble a peck of red clover per acre, which, with volunteer vetches, come off about the middle of May. The second yield of clover is uniformly eaten up by grasshoppers. The top root remains to fertilize the then coming Guinea grass, which should be cut when from two to three feet high.

My barns will contain two hundred and fifty tons of hay. I know of no point this side of the Island of Jamaica, where the seed of the Guinea grass can be obtained. The Guinea grass would not answer in a Northern climate. On such land as mine, it will afford three or four cuttings if the season is propitious. I use an average of five tons of gypsum, soon after the first cutting, and about the same quantity of the best commercial fertilizers, in March or April.

I use mowing machines. The grass which is cut at noon, is put up with horse sulky rakes, in cocks, before sundown.

I believe in shelter and paint for the preservation of every tool. I have wagons built in 1852 and 1853; also, carts and harrows of like age, now perfectly sound. My experience and observation teach me that farmers, as a class, to be successful, require more brains than any of the so-called learned professions. Very respectfully,

N. B. Moore.

NATIVE GRASSES.

The native grasses of the South are an interesting subject of study. We have much to learn in regard to them. Our absorption by cotton has heretofore prevented due attention both to them and the cultivated or artificial grasses. It is very certain that the famous Texas grasses once covered the surface of the richer portions of the older Southern States. These, when desirable, may be restored by the restoration of the soil to its former fertility. But both the experience and reading of the writer have satisfied him that none of these Texas grasses are equal, either for hay or pasturage, to some of the artificial grasses now in cultivation at the South.

It is doubtful whether we may expect to find any native evergreen grass at the South, the value of which is not known. It is possible that such discoveries may be made in swamps inaccessible to cattle, by examinations made during the winter. The possibility is of sufficient importance to justify attentive observation on the part of those who own this description of land.

A grass, to be valuable either for hay or pasture, must take a firm hold of the soil by its roots. A grass that pulls up easily, however promising it may appear to be, is of little worth. It will be either easily destroyed by the sun, or by the grazing of live stock.

Little value can be attached to a grass, which is an annual, requiring annual re-sowing. Grasses which seed themselves, as crab-grass and crow-foot, are more valuable than those which require re-sowing.

The field of inquiry as to hay grasses is much larger than that of the winter grasses. It is quite possible that some valuable hay grasses have been heretofore overlooked by us.

Because a grass is rejected, when in flower, by live stock, is no evidence that it will not make a good hay. Turn cattle into a meadow of herdsgrass or timothy when they are ready to cut, and they will eat them with reluctance. But if turned upon timothy or herdsgrass when they are young and tender, both will be eaten with avidity.

It seems to be a general, though perhaps not an universal rule, that any grass of which live stock are fond when it is young, if it grows tall enough to cut, will make hay of more or less excellence if cut and cured when in flower.

Some of our young men, who are beginning to see with their own eyes and not the glasses of others (and there are many such), would do a public service if they would attentively examine the tastes of cattle and horses while grazing, observe the grasses of which they are fond in the spring, transplant some of them into an experimental plat, and in the proper season cut and cure them for hay. Their value, or want of value, will be quickly determined when offered to horses or cattle.

Among our grasses, which are green all winter, are the two varieties of Lyme grass or Elymus. There are six varieties of this grass in the United States. Only two of them have been observed in Georgia, and the difference between them is not material. The Elymus is known among us as Wild Rye, or Terrell grass. The first name was given to it popularly on account of the resemblance of its heads to rye. The other, as Dr. Terrell, of Sparta, Georgia, brought it prominently into notice many years ago. This grass is native from the mountains to the seaboard of Georgia. Wherever cattle have unrestricted access to it in the winter and spring, they destroy it—biting it into the earth and preventing its seeding. Hence in the older parts of the South, it can be found only in fence corners, where it has been protected by bushes or briars. In such localities it can be found all over this State. I have seen it growing luxuriantly in the blue limestone lands of northwest Georgia, on the sand hills near Augusta, in an old fence row, and on the rich alluvial land of Hutchinson Island, opposite Savannah, and among the small cane on the coast generally.

This grass will live on thin land. But the soil to make it valuable must be rich—the richer the better. It lasts for years. I have known it to occupy and flourish on the same spot for twenty years. It grows as well on sandy as on clay lands, requiring only fertility. Horses, sheep, and cattle, are very fond of it during the winter and spring. Hogs reject it. Orchard, blue, or meadow-oat grass are either of them preferable to it, where they thrive. Whatever doubt there may be as to their thriving in a given locality, there can be no doubt of the thrift of the Terrell grass in any part of the South, however hot it may be, if the soil be made rich. The planter living in the flat and somewhat sandy portions of the South, who says he cannot get a good winter pasture, has certainly never tried the Terrell grass on rich land. The seed is very light. Two bushels by measure should be sowed to the acre.

It is very frequently remarked in the thinly populated portions of the South, where the summer pasture or range is good, "we can keep as much stock as we can winter." With one hundred acres of Terrell grass on rich land, from which stock has been excluded during the summer and fall, one hundred head of cattle, or five hundred sheep, can be carried from Christmas to April.

GAMMA GRASS.

This is a native of the South, from the mountains to the coast. The seed stem runs up to the height of five to seven feet. The seeds break off from the stem as if in a joint, a single seed at a time. The leaves resemble those of corn. When cut before the seed stems shoot up, they make a coarse but nutritious hay. This grass may be cut three or four times during the season. The quantity of forage which can be made from it is enormous. Both horses and cattle are fond of the hay. The roots are almost as large and strong as cane roots. Hence, it must be meant to stay where it is put. It would require a team of four or six oxen to plough it up. It can, however, be easily killed by close grazing, and the mass of dead roots would certainly greatly enrich the land.

As the seeds of this grass vegetate with uncertainty, it is usually propagated by setting out slips of the roots about two feet apart each way. On rich land the tussocks will soon meet. Gamma grass grows equally well on rich upland or bottom land. In the absence of the finer hay grasses, this grass will be found an abundant and excellent substitute. The hay made from it is very like fodder; is quite equal to it in value, and may be saved at a tithe of the expense of the former.

CRAB AND CROW-FOOT GRASSES.

These grasses are so well known at the South that but little need be said in regard to them. Both of them answer a valuable purpose, both for hay and pasture. The crow-foot is confined to the lower and sandy part of the Southern States. The hay made from it is more esteemed than that from crab-grass.

Both of these grasses should be cut as soon as they are in blossom. Some farmers *pull* the hay from among the corn. This is a little worse than pulling fodder.

Any one wishing to save crab-grass or crow-foot hay, should select a piece of rich land, and, after the weeds have sprung up, plough them under. If they spring the second time, they should again be ploughed under, the land then harrowed and afterward rolled. This will give a smooth surface for the mower. This treatment will ordinarily give a large and clean crop of hay, free from weeds. Very frequently of a wet season a good crop of this hay may be obtained after small grain is cut. But this is precarious, and the farmer will not do well to rely on it. It is better by a little more labor to be certain.

The objection to these grasses as a reliance for hay is, that the hay, though large in quantity, is light as compared with better grasses, as it is ordinarily treated—that is, cut when the seed is ripe, it is inferior to straw—that they are annuals and make no sward.

For pasture they are of great value. For this purpose they are often badly managed. Cattle and sheep are turned upon the grain stubble as soon as the grain is cut. Hogs may be put upon the stubble for a short time, to eat up the shattered grain. They should be removed, and all stock kept out of the pasture until the grass has made a good start. Treated thus, the pasture will be valuable until frost.

This is a singular advantage. It is not advisable to pasture clover and the cultivated grasses closely during the heat of summer. The crab-grass is an admirable substitute until cool weather begins, when the stock may again be turned into the artificial pastures. The Northern dairyman would give a great deal for a fresh crab-grass pasture in August, when the grass of the spring is old, dry, and perhaps burned by the sun. In the absence of this reliance he must soil his cattle.

BROMUS—BROME GRASS—RESCUE GRASS—CHEAT, OR CHESS.

This Bromus family would not be noticed were it not for the fact that every now and then some member of it produces a temporary excitement, and a very decided loss of money on the part of the farmer. There are seven varieties of Bromus. The most common is that pest called cheat. Some persons think that the small grains, under certain circumstances, turn into cheat, as if the Almighty ever made one thing that could be turned into another. Everything that was made, was made perfect of its kind, and stays

so. We might as soon expect wheat to be turned into oats or rye, as into cheat.

The botanical description of the Bromus genus is as follows. The unlearned farmer will not understand all the botanical terms, but he will understand enough of them to be able to detect a Brome grass by whatever name it may be called. Besides, all the girls who attend our female colleges study botany—so that if the father cannot determine, the daughter can, if she has been properly taught:

"Spikelets from five to many flowered, panielled; glumes not quite equal, shorter than the flowers, mostly keeled, the lower one to five, the other three to nine nerved; palcæ herbaceous, lower one convex on the back or compressed, keeled, five to nine nerved; awned or bristle-pointed from below the tip; upper palca at length adhering to the groove of the oblong grain; fringed on the keel; stamens three; styles attached below the apex of the ovary. The grasses of this genus are coarse, with large spikelets, somewhat drooping generally when ripe."

Flint remarks, "Not one of the brome grasses is worthy of a moment's attention as a cultivated agricultural grass, and the cleaner the farmer keeps his fields of them the better."

On rich land the brome grasses, including the common cheat, make a nice winter pasture. But this pasture is bought at too dear a rate by the small grain grower, as the seeds of this family ripen at the same time with wheat, and diminish the value of the grain. Barley or rye on rich land will yield more winter pasture than the species of this family called rescue grass, and are not liable to the same objections. If a farmer desires an annual winter grass pasture, he should sow Italian rye-grass, of which more will be said hereafter.

BERMUDA GRASS—CYNODON DACTOLON.

Although this has been introduced from the West Indies, it has been so thoroughly domesticated in parts of the South that it may be classed among native grasses.

It is said to be the celebrated Daub sacred grass of India. At the South, generally, it has received cursing rather than blessings, especially by exclusive cotton planters.

Not having had any extended personal experience of this grass, yet having formed, from long observation, a high opinion of its value, instead of giving my own estimate of it, I have thought it best to lay before the readers of this manual the opinions of gentlemen who, by long familiarity with it, are well qualified to pronounce in regard to its merits. Accordingly, extracts from letters are submitted from Colonel A. J. Lane, a successful cotton planter, formerly of Hancock County, Ga., now of Macon, Colonel T. C. Howard, Secretary of the Georgia Department of Agriculture, Dr. St. Julien Ravenel, of Charleston. It would have been gratifying to have given these letters in full, but this would have too far enlarged this little manual.

The points presented to these gentlemen were the following:

What is the best method of destroying Bermuda grass, and how many seasons does it require?

What is its manurial value?

What is its value for grazing and for how much of the year?

What is its value as a hay grass?

Colonel Lane says: "Upon our ordinary upland I have found no difficulty in destroying it, by close cultivation in cotton for two years. It requires a few extra ploughings to get the sod thoroughly broken to pieces. The breaking should be done with a small plough first, and a harrow run over it once or twice. All of this in winter or early spring. Take advantage of the dry hot months of summer to have the grass that may be found alive, ploughed and hoed, and exposed as much as possible to the sun. With the ordinary seasons, so much of the grass will be killed the first year, that but little interference with the next crop need be apprehended. Pea vines, or any crop that will thoroughly shade the land, will kill it. When not pastured, broom sedge or briars soon destroy it. Upon low lands, where there is much moisture, its destruction is impracticable.

I think it very doubtful whether there is an acre of land in the South thoroughly set in Bermuda grass, (if the proper use was made of it,) that is not worth more than any other crop that can be grown on it. If I am right in this broad opinion our effort should be not to kill it, but to propagate it. I am myself planting it in every year upon such land as does not pay for cultivation, and how much such land is there throughout the South.

I cannot better illustrate the grazing value of Bermuda grass, than by an instance in my own experience. Nearly thirty years ago I bought an old plantation, near my place in Hancock County. It was bought low on account of its being *infested* in places with Bermuda grass. I permitted a man to use thirty acres of it which were fully set in Bermuda grass. He had at the time, a cow and calf, sow and pigs, and a brood mare. He cultivated a little crop of corn, but never enough to feed his family. His stock lived upon this thirty acres of Bermuda grass, except for a short time during the winter, when they had access to other parts of the plantation. He remained upon this place for five or six years. At the end of that time, he had twenty-five head of cattle, seventy-five hogs, and five horses. I offered him for

his increase $1,000 which he refused. So much for the grazing value of Bermuda grass.

I cannot give you a better illustration of the manurial value of this grass, than by reference to the crops made on this same thirty acres of land, after the man referred to had left the place.

First crop, cotton, half stand, owing to the mass of undecomposed sod, eighteen hundred pounds of seed cotton per acre.

Second crop, cotton, two thousand eight hundred pounds seed cotton per acre.

Third crop, corn, sixty-five bushels per acre—corn manured with cotton seed.

Fourth crop, wheat, forty-two bushels per acre.

The average product of this land without the sod, would have been not more than one hundred pounds of seed cotton, fifteen to twenty bushels of corn, and eight to ten of wheat. I know of no crop that will improve land more, and certainly none that will, at the same time, give so large an income with so little labor.

I have never made hay from it. A gentleman of this County informed me a few days since, that he had just cut from one acre of Bermuda grass, eight two-horse wagon loads of excellent hay.

Col. T. C. Howard gives an equally strong opinion of the value of Bermuda grass, in the following extract:

"The desideratum to the South is a grass that is perennial, nutritious and adapted to the climate. While we have grasses and forage plants that do well when nursed, we have few that live and thrive here as in their native 'habitat.' The Bermuda and crab grass are at home in the South. They not only live, but live in spite of neglect, and when petted and encouraged, they make such grateful returns as astonish the benefactor. I have known $114 worth of hay sold from seven-eighths of an acre of Bermuda grass in one season. I have known this 'pest,' so called, extirpated, after twenty years. Sod that had been undisturbed by any tool, and astonishing crops, both of cotton and corn raised in place of it the first year. Indeed I doubt if even the far-famed blue grass sod is a better fertilizer, and every one knows what the Western Virginians think of that as a restorer of impoverished land."

"To destroy Bermuda grass, run a coulter or narrow bull tongue through it, then set a turning plough to run very shallow, and turn the surface *over*, but not *under*. This exposes the roots to cold and frost, which will as certainly kill it as it will kill sugar-cane. But my trouble is to raise it to the greatest perfection, not to destroy it. One acre of good Bermuda grass, as good as my friend's, who sold the $114 worth of hay from less than an acre will give a gross product of twenty per cent. on $570.

White Bermuda grass has seed vessels; it certainly has no seed. There are the effigies of seeds, but not the seeds themselves. The proof of this is, that while red and white clover, the whole family of grasses and weeds, can be propagated by the spread of annual manure, no one ever saw a patch of Bermuda so propagated. It must be grown by its roots and joints.

The proper plan of setting land in Bermuda is, to run, in small checks, a sharp "sword coulter" through the soil, then lift the turf, remove it to running water, wash out the dirt, and run the roots through a cutting-knife so set as to chop fine. Then sow broadcast and plough under shallow, as you should do in putting in wheat.

If Bermuda grass be trampled or grazed by stock, it will for an indefinite period hold its place. While grazed, neither Lespedeza, broom sedge, blue grass, or any other growth, will oust it. But if enclosed and ungrazed, broom sedge will certainly kill it out in three or four years. No one need fear the introduction of Bermuda grass on his farm, from an apprehension that he cannot get rid of it when he desires to do so. Either of the above methods will certainly destroy it.

Dr. St. Julien Ravenel, an accurate man of science, makes the following remarkable statement in regard to Bermuda grass. The experiment was conducted near Charleston, S. C.:

"One-eighth of an acre of ordinary land covered with Bermuda grass was ploughed in March last (1874), harrowed, rolled smooth enough for the mowing machine, and fifty pounds of ammoniated super-phosphate of lime applied.

Four cuttings were obtained which yielded two thousand eight hundred and eighty pounds of hay. This was at the rate of ten tons to the acre.

The first cutting contained ten per cent. of albumenoids, the last cutting fourteen per cent. albumenoids. Ash 6½ or 1.456 of ash to the acre. The hay was nicely cured, and was preferred by horses and cattle to hay brought from the North."

The opinions of these gentlemen are very decided as to the valuable qualities of Bermuda grass, as to grazing, for hay and manurial purposes. The continued and careful observation of the writer corroborate the results of their practical experience.

The exclusive cotton planter shrinks from this grass. If he would shrink from so much cotton it would be a more valuable shrinkage. Yet the writer has seen fields, which were covered with a dense Bermuda grass sod, completely cleansed of it by two successive crops of cotton, and those crops were invariably fine. It is true that the inversion of a Bermuda grass sod increases at first seriously the cost of the cultivation of the cotton crop.

But this increase is not equal to the cost of buying commercial fertilizers. No ordinary application of these fertilizers will communicate to the soil an equal degree of fertility with that which is communicated by the inversion of a Bermuda grass sod. The fertility created in the latter case will be felt for several years—in the former it is ephemeral.

The following rotation on Bermuda grass land has been adopted by some cotton planters with excellent results. The first year cotton, the second, corn, the third, oats or wheat, sowed after corn. The grass which has been scotched, not killed, begins to run as soon as the small grain is cut, and if grazed for two or three years there will be a thick sward of Bermuda on which the same rotation may be repeated. Under such a rotation the soil, now the only capital of the Southern farmer, would rapidly improve. If he will take the pains to calculate the value of this intermediate grazing, he will find that it will be, in either horses, mules, colts, cattle or sheep, an enormous per centage on the sum for which he would gladly sell his land.

If, when the soil is not too sandy, Bermuda grass is torn up by the plough or coulter, blue grass and white clover seed are sowed, after harrowing and previous to rolling, the perfection of a pasture, capable of sustaining the best live stock, whether horses, mules, colts, cattle, sheep, or hogs, will be produced, winter and summer. There is nothing equal to it at the North, or in Europe. As the Bermuda dies down in autumn, the blue grass and white clover then appear, the reverse recurring in the heat of summer.

More than thirty years ago the writer, walking with a gentleman of far-reaching mind, and observing the gullied and excoriated condition of the soil near Milledgeville, enquired, "What is to restore its fertility to the worn out portion of Georgia?" The answer was promptly given. "Sheep and Bermuda grass" There was profound wisdom in the reply. A large portion of old Georgia must become a sheep walk before it can be restored to fertility, and the land owners become independent of the negro.

Possibly some persons might think it a degradation of even a worn out cotton field to convert it into a sheep walk. It would, indeed, be degrading it to the level of an English farm, worth from three to four hundred dollars an acre. It would be well for us if we suffered this degradation. Besides all the land in clover and meadow, of which there is a vast amount, forty-eight per cent of the whole of the valuable soil of England is in permanent pasture.

So much space has been given in this manual to Bermuda grass, on account of the prejudices against it, its great value, and the facts that while the artificial grasses are expensive, it is within easy reach of the poorest farmer.

It would be improper to close these remarks upon the natural resources of the South in the way of native forage plants and grasses without reference to the value of our common cane as a winter food for mules and cattle. Our canebrakes should be preserved with the greatest care. Where they have been destroyed they may be renewed by inclosing and keeping hogs and fire away from them. If cattle are turned in the fall fat into a canebrake they will not lose flesh, but improve until grass comes again. With a judicious management of cane in those portions of the South in which it grows, vast herds of cattle might be kept at trifling expense. As the cane is a swamp growth, cattle could be driven into the cane pasture in the morning and driven out and penned at night on poor upland, thereby making it rich without damaging the cane ground.

Without reference to the artificial or cultivated grasses, we have the following natural reliances for live stock food during all seasons of the year: Terrell grass and cane for winter pasture; Gama, crab and crow-foot grasses for hay, Bermuda, the sedge, and other common grasses, including crab-grass and crow-foot, for spring, summer and fall grazing.

With these reliances alone, sheep and cattle can be raised at the South to decided profit. They will enable the poor man to begin stock raising, who cannot afford at once to make his lands rich, or to buy grass seeds, which are expensive. As his means improve he may add such of the artificial grasses as may be adapted to his particular locality.

In large portions of the South there are creek and river bottom lands which are now utterly useless. They are too wet for reliable cultivation with the plow, and are grown up into impenetrable thickets of briars, vines and bushes. If such land is grubbed in August, and the timber where it is too thick is thinned out, and if the next season hungry cattle, sheep and goats are kept upon it, they will destroy the sprouts, and in a short time the natural winter grasses will form an excellent winter pasture. These grasses will spring up spontaneously. Thus with a little labor; at a season of comparative leisure, a piece of profitless property may be made profitable in a double sense—one of fattening stock in winter at no other cost than the interest on the land, and the other of making that stock, by penning at night, an improver of land which requires improvement.

Time sometimes misleads us. He clothes error with gray hairs and makes him venerable. There are many persons who prefer an old error to a new truth. While long existing opinion should be approached with caution, it should be, if the expression may be

allowed, with bold caution. That which may have been sound policy in one condition of affairs may be very unsound in another. Our fathers made nothing but cotton and corn. They thought they did right. But because it may have been right for them, it does not follow that it is right for us. We have never availed ourselves of the full natural resources of soil elements and products with which God has blessed us. When we have thus availed ourselves, and to these natural resources have added the appliances of modern agricultural science, the South will have attained a prosperity which will make her a marvel among the peoples of the earth.

WINTER GRASSES.

One of the most marked and singular advantages of the South, is its ability to grow grasses which may be pastured in the winter. It is a blessing of climate which we have not yet appreciated. The raising a full supply of horses, mules, cattle, sheep and hogs for our own consumption, is an absolute essential of skilled agriculture. For all of these, except the hog, grass, either green or cured, is necessary. The cost of cutting and saving hay has been greatly reduced by the use of improved implements. Slill it is something. Besides the cost of the hay is the cost of the barn to store it in, and in addition the cost of feeding it out. A barn sufficiently large to hold the hay for a considerable stock, is an expensive affair. Nearly all of this expense is saved by good winter pastures. The stock upon them do their own mowing, and are their own barn. Exceptional periods occur, as in a heavy freeze or severe storm, when some hay must be fed. By the aid of the winter grasses, it is perfectly practicable to raise colts, cattle and sheep, throughout a large portion of the South, without other cost than the interest on land and the value of the salt. The first object of the farmer, who designs to grow the grasses, should be to sow those which are green all the winter. "Roughness," as it is called, may be temporarily secured by sowing corn, peas, millet and oats. But there is no adequate substitute for winter grass pastures. Oats, barley and rye may be grazed, but the stock must be taken from them at a season when the necessity is most pinching, and besides they must be sowed annually, which is expensive. They are decidedly to be preferred to no winter pasture, but are very inferior to permanent grass pastures.

MEADOW-OAT GRASS.

This grass deserves to be placed at the head of the winter grasses for the South. It has the double advantage of being a good hay as well as winter pasture grass. It does not answer well on moist land. Rich upland is the proper soil for it. On such land it will grow from five to seven feet tall, completely hiding a man walking in it. It will grow on more sandy land than most of the artificial grasses. Hence it is well suited to a large portion of the soil of the cotton belt, perhaps better suited on this account than any other upland grass. The yield of hay on rich land is large and the quality is excellent. It matures rapidly. Seed sown in the spring will produce seed in the fall. The seed is ripe when the stalk is green. It shatters easily, and the seed must therefore be saved in time. If it be desired to save seed, it is best to cut off the heads with a cradle and tie in bundles as grain; afterwards the rest can be mowed for hay. This is a great advantage of being able to save hay and seed from the same crop. Of a wet season it may be necessary to cut a second crop. After it is cut no stock should be allowed to graze it, during the summer and fall. The rowen or aftermath, or aftergrowth, all of these named being used, should remain until after Christmas, then the stock may be turned upon it in dry weather and remain during the months of January and February. If it be not designed to make hay, they may be continued on it until the other grasses spring. The amount of green food yielded by this grass during the winter is greater than that of any other grass. On rich land at Christmas, the ends of the leaves will have turned yellow, but there will be found an astonishing mass of green grass beneath, which live stock eat with avidity; this, according to Flint, is the ray grass of France. The seed is very light and chaffy. It is proper to sow two bushels to the acre. It is a tussock, or bunch grass, not spreading from the roots, hence the necessity of heavy seeding. The amount of seed required makes the beginning expensive, but if sowed by itself, an acre will give a large amount of seed, and subsequent purchases become unnecessary.

In this connection it will not be amiss to make some remarks on winter pastures generally.

They must not be pastured when the ground is wet; at such times all stock must be removed from them. They must not at any time be grazed too closely. Everybody knows how to treat a rye or barley lot. It is well known that if stock bite into the crown of the plant it will be killed. Winter grass pastures must be treated in the same way with grain pasture. The temptation to transgress in this particular is very great. When all other vegetable matter is dead, live stock become almost crazy for green food, and they are suffered by the sympathizing owner to remain while a particle of green food is visible. As a consequence of this practice persisted in, the grass is killed. It will be better to buy fodder, if it be necessary, rather than allow a practice so ruinous to the farmer.

In order to make winter pastures valuable, the ground should be heavily manured. This manure may be given to the preceding cotton or grain crop. The winter pasture should be the richest land on the farm. It should be prepared as for a barley lot It is impossible to make something out of nothing. The artificial grasses are highly concentrated food, and it is out of the question to raise them on poor, or even moderately fertile land.

In all well-cultivated countries, it is conceded that the wisest use of manure is to apply it to meadow land. How much more valuable is it to apply manure to land which gives all the good results of hay without the cost and trouble of cutting, curing and housing it? In any movement toward an improved agriculture at the South, the first step should be the laying down of rich winter pastures.

ORCHARD GRASS.

This valuable grass ranks next in importance to the tall meadow-oat grass for hay and winter pasture. It succeeds very well at the South on drained and dry bottom land, or on rich upland. There is a peculiarity about it. The writer has never observed it to spread from the scattering of its own seeds. From some unaccountable reason the shattered seed does not vegetate, if, therefore, it be sowed too thin it does not fill the gap, and presents an unsightly appearance and gives inferior grasses a chance to occupy the vacant space.

Orchard grass for hay should be cut as soon as it begins to blossom; if cut then, the hay is sweet, tender and nutritious, but if the cutting be deferred until the seed has formed, the hay will be hard and valueless.

After cutting, orchard grass springs rapidly, and the aftergrowth is heavy. This should not be pastured during the summer or fall, but should be reserved for winter grazing. It should be treated as above directed in the case of the tall meadow-oat grass.

The seed of orchard grass is also very light and chaffy, and therefore two bushels should be sowed to the acre.

This grass was introduced into England from Virginia, in 1764. It is very highly valued in that country, and in the Northern States it holds a high rank as a hay and pasture grass. But its chief benefit is lost at the North, as it cannot be pastured there during the winter.

Orchard grass is not suited to wet bottom land, but thrives in a rich upland. It grows well in an orchard or in thinned woodland. With the exception of meadow-oat grass, orchard grass stands a drought better than any other of the cultivated grasses.

Where hay is an object, these two grasses, meadow-oat and orchard grass, should be sowed with red clover and white, as each of the four blossoms at the same time, and is, therefore, simultaneously ready for the scythe. They answer also to mix with clover in a rotation, where the clover is to stand two or three years, as they mature rapidly, and assist in giving a compact sod. The farmer should remember, that a sod of good grass and clover turned under is quite equal in value to a costly application of either putrescent or purchased manures. The cultivation of these two grasses at the South cannot be too strongly recommended on soils adapted to them.

ITALIAN RYE GRASS.

This is perhaps the most beautiful of all the grasses. On very rich land, the green of the blades almost approaches blackness, and their shining lustre is metallic. It seems to be indifferent to climate and texture of soil, requiring only dryness and richness. It thrives as well in the severe climate of Scotland as in its native sunny Italy.

The statements of the yield of this grass on the irrigated lands near Edinburgh are almost incredible. It has been grown with success in all parts of this State, Georgia, from the sandy lands of the coast to the blue limestone lands of the northwestern part of the State.

It is an annual, and should be sowed in August or September, at the rate of ten pounds of seed to the acre. Italian rye grass sowed in August or September will be ready for grazing in February. Although the return in winter grazing or hay is very large, on account of its being an annual, it is doubtful whether it be really more valuable than barley or rye, for the above purposes.

BLUE-GRASS.

This well-known grass is, for certain purposes, one of much value. It is supposed that it is adapted only to a limited character of soils and climate. Kentuckians will tell us that the successful growth of this grass is monopolized by the Blue-Grass region of Kentucky. This is a mistake. The lands in Kentucky on which the blue-grass grows with such vigor, will bring fifty to seventy-five bushels of corn to the acre. Make any other lands at the South, unless it be a sand-bed, equally rich, and blue-grass will grow well on them. In fact it is native in localities suited to it all over the South. It will be observed everywhere at the South, about abandoned settlements, to which stock have not had access, and especially where locust, china-berry or walnut trees are growing, that both blue-grass and white clover have sprung up spontaneously. The writer has seen it growing in protected spots along the roadsides near Savannah. It certainly has annoyed him by coming an unasked volunteer into his meadows of herdsgrass and timothy in the blue limestone bottoms of Bartow County.

There are three reasons why it is generally

supposed that blue-grass will not succeed at the South.

It has been sown on land that is too poor. It requires a soil naturally or artificially rich.

Because it is burned up in a dry summer, it is concluded that it is a failure, and is ploughed up. In Kentucky and in Ohio, blue-grass frequently becomes so dry in the summer that it would burn up, if set on fire. But as soon as the cool weather and the rains of autumn set in, it resumes its green color and renews its growth. The same result will occur in the cotton States.

It may be remarked in passing, that all the winter grasses stop their growth and turn more or less yellow during the dry heat of summer at the South. This is to be expected. Everything which grows, animal or vegetable, must have a period of sleep or rest. The grass which grows at the North during the summer, rests during the winter. The converse is true. The grass which grows at the South during the winter, must rest during the summer. Hence, winter grasses at the South should not be pastured during the summer, but should be left with a covering of their own leaves to shield them from the heat of the sun, and make the sleep of the roots comfortable.

The third mistake in the cultivation of blue-grass arises from an ignorance of the habits of the plant. When it first comes up it is as fine as a needle, hardly visible to the most careful inspection. It increases its size but little during the first summer. Even the next year the stand will seem to be imperfect. But in the third and fourth year it spreads like magic, and occupies the whole ground. When a man goes into the lot on which he has sowed blue-grass seed, finds month after month no blue-grass, but a crop of weeds as high as his head, he concludes that it is a failure, ploughs up the ground, and next spring puts it in cotton.

If a piece of ground be made very rich, and good blue-grass seed be sowed upon it, there will be no failure. Give it time and it will take possession of the ground, even though it be invisible the first year.

On account of its slow maturity, blue-grass seed should never be sowed by itself. It should be mixed with red and white clover, meadow-oat and orchard grass. These will occupy the ground at once, and the blue-grass will advance slowly, but in the end will whip the whole of them out, except the white clover. For this reason blue-grass should never be sowed with grasses designed for permanent meadow, as it will be certain finally to root them out.

On very rich land, blue-grass will make hay excellent in quality, but small in quantity. Its chief value is for winter pasture. While they last, meadow-oat and orchard grass are much superior to it. But the permanence of blue-grass gives it a great advantage. It will last an indefinite number of years. After having been long grazed it becomes what is popularly called "hide-bound," and ceases to thrive. If a coulter is then run through it both ways, thoroughly tearing the sod, the grass will renew its youth and spring again with great vigor.

Blue-grass, designed for winter pasture, should be treated in the same way with meadow-oat and orchard grass. Thus treated, it will not only last, but will continue to improve. This improvement will be the more decided if the stock grazing it are suffered to remain all night upon it. It should be remembered, in the treatment of pastures, that a large portion of the excrement of live stock is voided during the night, or when they first rise in the morning. This is, of course, lost to the pasture when the stock are driven to the yard at night.

Blue-grass will bear more shade than any other grass, and it should, therefore, be the main reliance in woodland pastures. While it affords excellent grazing for horses, cattle, and sheep, its greatest value is for hogs, especially in woodland pastures. The trees thinned out and trampled around scarcely ever fail in their mast, and between the acorns and grass, hogs can be raised and nearly fattened at very small expense.

Four quarts of seed should be sown to the acre. No stock should be allowed to go on the ground the first year, nor indeed the second, until about the first of June, when a portion of the grass has gone to seed.

There is, perhaps, more nutriment in a given amount of blue-grass than any other grass with the exception, perhaps, of the Bermuda. Live stock will keep fat on it, when they seem to be biting into the very clay or gravel. Close grazing does not injure it as it does many other grasses, from the fact that it is stoloniferous, or runs and spreads from the roots. On the whole, it is an exceedingly valuable grass to the Southern farmer who owns land rich enough to produce it.

The grasses named, viz: meadow-oat, orchard, and blue-grass, must be our chief reliance for permanent winter grass pasture. The wild rye, or Terrel grass, will be found to be a useful adjunct. These four should be sowed together.

HAY GRASSES.

The grasses already described have their value as hay grasses, but are most valuable for their winter use. There are other grasses which are not green during the winter, which afford little aftermath, and which are valuable solely for their hay. At the head of these stands

TIMOTHY.

The history of this valuable grass is in some doubt. Loudon, in his *Encyclopedia of Agri-*

culture, states that it is a native of South Carolina, and was introduced into England in 1780, by Timothy Hudson. Flint says that by some persons it was said to have been introduced into England from Virginia, in 1760, by one Peter Wynne. It is sometimes called cat-tail, from the shape of the head. In New England it is called Herd's grass, as a man of that name found it growing in a swamp in New Hampshire. This should be borne in mind, when we are reading New England agricultural newspapers, otherwise we shall be confused. What we call herdsgrass, they call red-top.

As a mere hay grass timothy is, perhaps, unrivalled. It is extremely nutritious. Four tons of this excellent hay have been frequently cut from an acre.

It is useful only as a hay grass. It has little or no aftermath; it is not green during the winter. It should rarely be pastured, as its roots are bulbous, and the plant is easily destroyed by close grazing.

The soil suited to it is the richest of bottom land that is dry enough for wheat. At the South it does not thrive on upland. The well-drained rice land of the coast would produce it in perfection. In our city markets timothy hay commands a higher price than any other.

This grass should not be sown with clover, as the clover is ready to cut before the timothy. There must be a loss in one or the other. Timothy should be cut when it is in full blossom. As it is a late grass it has this advantage, that the wheat crop may be saved before the Timothy is ready. Twelve pounds of seed should be sowed to the acre.

HERD'S GRASS.

For hay alone this grass ranks next to Timothy. The soil best suited to it is moist, swamp land. It will grow almost in running water. It yields a valuable return on thinner land than, perhaps, any other of the cultivated grasses. Its chief requisite seems to be moisture. There are large bodies of pipe-clay land at the South which will produce nothing but oats, which will make fair Herd's grass meadows. Of course the richer the land the greater the yield. The hay is good in quality, and sometimes very large in quantity. The grass should be cut just as the seed begins to ripen, and before the stalk has changed its color. Sow a peck of seed to the acre.

Timothy and Herd's grass should be sowed together, as they are ready for the scythe at the same time. This mixture is better than either grass singly. The Timothy will be some eighteen inches taller than the Herd's grass, and the mixture of the two will give a heavy cutting close to the ground.

In the preceding description all the forage plants and grasses are noticed which the writer believes are practically useful at the South. A great number of other plants and grasses have been tried by him in a series of experiments running through thirty years, and have been rejected as unsuited to our soil and climate.

TIME OF SOWING GRASS SEEDS.

Experience has proved, so far as the observation of the writer goes, that August or early in September is the best time to sow grass seeds, or about the same time with sowing turnips. There is usually sufficient rain at that season to cause the seeds to germinate. The young plants will have time to make sufficient root to stand the severest cold of winter. When sown at this time there is a gain of a season, as clover, lucerne, and several of the grasses, if sowed without grain in August, will give a cutting in the following spring. Should there be a failure of the seed, an opportunity to re-sow will occur in the following February.

Grass seed sown late in the fall is liable to be winter killed. If the farmer cannot sow early in the fall, it will be wise in him to defer sowing until the ordinary time of sowing oats. The different parts of the South vary so much in climate, that it would be wrong, perhaps, to specify any particular month or months for sowing grass seeds. The general rule may be stated, the application of which will vary according to locality, that it is best to sow sufficiently early in the fall to avoid danger from freezing, or if deferred until spring, the usual time of sowing spring oats.

SOWING WITH OR WITHOUT GRAIN.

There can be no doubt that sowing grass seed with grain should always be avoided, unless necessity requires it. The objections to this practice are, that it involves the loss of a year in either hay or pasture. As has been stated, clover, lucerne and several of the grasses, if sown early in the fall without grain, will give a cutting or may be pastured in the following spring. If sown with grain, the grass will be of no practical use during the season after the grain is cut. No grass should ever be cut or pastured until after it has gone to seed once. This seeding will secure a full occupation of the soil. Of a wet season, clover and some of the grasses may seed late in the fall after grain is cut, they may then be pastured lightly with calves or sheep. But the grass is of little value during that entire year.

There is another objection to sowing grass seed with grain. When the grain is cut, the young grass and clover are very tender, having been shaded by the grain. The cutting suddenly exposes them to the sun at the hottest season of the year. There is great danger, therefore, that they will be burned out. If

sowed alone the heat affects them gradually, and if the ground is occupied by weeds, these mature and decay slowly, and not until autumn admits the heat of the sun to the young grass.

The justification of sowing grass seed with grain is our present poverty. It may be, and in nine cases out of ten it will be, necessary to manure heavily land to be put in grass. The necessities of the farmer require that the cost of the manure should be repaid the first year. In that event, he must sow grain with his grass seed, but always remembering that by so doing he loses a year and endangers the grass.

When grain and grass are mixed both may be sowed either in the fall or spring. Or the grain may be sowed early in the fall, as oats among cotton, the grain may be pastured during the winter, and in the spring it may be harrowed, clover and grass seed sown upon it, and then rolled. The grain will be benefitted by the harrowing and rolling, although at the time it may look like destruction.

WHETHER IT IS BEST TO SOW A VARIETY OF GRASS SEEDS.

The only instance in which it is advisable to sow the seed of a single grass or forage plant, are in the case of lucerne, which will not bear admixture, clover in a rotation, or where it is desired to save the seed of a particular grass. Perhaps in all other cases a variety of grass seeds should be sown.

The reasons for this practice are obvious. There are certain grasses which are called jungle or tussock grasses. These do not spread from the root, but grow in bunches, as orchard and meadow-oat grass. It is necessary that some running grasses should be sown with them to fill up the interstices, otherwise broom-sedge, nimble-will, or that pest, the native fox-tail, will take possession.

Again the appetites of the grasses differ as much as that of the cereals. The food which one grass rejects, another devours. We should imitate nature. If we will take a foot square of land which has been a long time in grass, we shall be surprised to find the number of different grasses which it contains. The lesson taught us is obvious. We should sow a sufficient variety of seeds to consume every variety of food, and so to occupy the ground as to keep out all intruders. Unfortunately, the list of grasses suitable to our climate is limited. We should use them to their fullest extent. At the hazard of some repetition the variety of forage plants and grasses and the quantity of seed to be sown is given.

PROPER MIXTURE OF GRASS SEEDS FOR DIFFERENT PURPOSES.

For a rotation and to improve the soil, red clover and orchard grass—four quarts of clover and one bushel of orchard grass and one bushel of meadow-oat grass. These grasses are selected in connection with clover because they mature rapidly; a slow-spreading grass like blue-grass would not answer in a rotation when the grass would occupy the ground only two or three years. These two grasses produce in the run of a year, a vast quantity of vegetable matter. The chief value of the clover is the amount of ammonia which it draws from the atmosphere, and by the decay of its roots and leaves imparts to the soil. These grasses would give an additional sward, which turned under would supply a large amount of humus, so necessary to our denuded and exhausted soil. The sward of both these grasses, being in themselves rich food, when turned under, makes rich soil. The farmer should always remember that plants differ greatly in their value as manures. All vegetable matters ploughed into the soil are a manure, but their value differs as much as our currency and gold. Both pass as money but there is a material difference in their value. The same remark holds true as to the value of the manure of animals fed on different kinds of food. One-fourth of the manure of an animal fed on cotton-seed meal, will go as far in enriching a soil as the whole of the manure of the same animal fed on shucks or straw.

GRASS SEEDS FOR MEADOW LAND.

One peck of Timothy, four quarts of Herd's grass, and four quarts of white clover per acre. If it be desired to obtain immediate results, four quarts of red clover may be added. This will disappear in two years if it be mowed so as not to be allowed to seed. For a permanent purpose the addition of red clover is not judicious, because, as has been previously remarked, it is ready for the scythe long before either Timothy or Herd's grass. It should be borne in mind that the word meadow is generally applied to bottom land in grass. When upland is mowed it is usually designated as upland meadow. Neither Timothy nor Herd's grass are suitable for mowing on upland.

FOR SUMMER PASTURES.

Our best summer pastures are Bermuda and crab-grass. Red clover is valuable during the spring and autumn. Herd's grass will give fair summer pasture on upland, especially on north hillsides; white clover is extremely valuable for certain kinds of stock; but, like red clover, after the seed has been matured, it salivates horses. Little reliance can be placed on the cultivated grasses for summer pasture; we are, however, abundantly supplied with natural grasses

FOR WINTER PASTURE.

Meadow-oat grass, orchard, blue and Terrell grass, or wild rye, and red and white

clover. One bushel of orchard, meadow-oat and wild rye, each, four quarts each of blue-grass and red and white clover. The blue-grass and white clover will ultimately take possession of the soil. This winter pasture should not be grazed after June or before Christmas.

FOR EARLY SPRING SOILING.

Lucerne comes very early in the spring, and may be used then for soiling and afterward for hay. A still earlier soiling reliance would be a half bushel of barley, a peck of Italian rye-grass, and the same of winter vetches. For this purpose land should be made very rich. On such lands, in most parts of the South, this mixture can be cut in February. In the absence of permanent winter pastures it would be found of great value to the farmer. It has this advantage, that its results may be realized within a few months after the seed is sown.

SELECTION OF SEEDS—BUYING BY WEIGHT OR MEASURE, WITH A TABLE OF WEIGHTS.

One of the great drawbacks to grass culture at the South is the cost of grass seeds. It is of the utmost importance, therefore, that the grass seeds should be good. Gross impositions are often practiced upon us by the seedsmen. Grass seeds three years old are unreliable. Old seeds are often mixed with those that are fresh The fresh will vegetate, the others will not. The farmer attributes the bad stand to the bad climate or his bad management, when it is attributable to the bad seed.

Flint gives an easy way of determinng the freshness of grass seeds: "Take two pieces of thick cloth, moisten them with water, and place them, one upon the other, in the bottom of a saucer. Place any number of seeds which it is desired to try upon the cloth, spreading them so as not to allow them to cover or touch each other. Cover them over with a third piece of cloth, similar to the others, moistened in the same manner. Then place the saucer in a moderately warm place. Sufficient water must be turned on from time to time to keep the three thicknesses of cloth moist, but great care must be taken not to use too much water, as this would destroy the seed. There should be only enough to moisten the cloth, and not enough to allow any to stand in the saucer. Danger from this source may be avoided, in a great measure, however, by tipping up the saucer, so as to permit any superfluous water in it to drain off. The cloth used for covering may be gently raised each day to watch the progress of the swelling or molding of the seeds. The good seed will be found to swell gradually, while the old or poor seed, which has lost its germinating power, will become moldy in a very few days."

In this way, also, any one can judge whether old seed is mixed with new. The latter will germinate much more quickly than the former. He can, moreover, judge of the quantity which he must sow, since he can tell whether a half, or three-fourths, or the whole, will be likely to germinate, and can regulate his sowing accordingly. The seeds of the clovers, if they are new and fresh, will show their germs on the third or fourth day; other seeds will take a little longer; but till they become coated with a mold there is hope of their germinating. As soon as the mold appears it is decisive, and the seed that molds is worthless.

It is always best to buy grass seeds by weight, rather than by measure. Knowing the weight of the different grass seeds, the buyer can determine whether he has been imposed on by the seedsman better than if he bought by measure. The following is a list of the weight of the seeds of forage plants and grasses suitable to the South:

Herd's grass, weight of a bushel of seed,	14 lbs.
Timothy	44 "
Meadow-oat grass	7 "
Orchard grass	12 "
Italian rye-grass	15 "
Blue-grass	13 "
Red clover	64 "
White clover	65 "
Crimson clover	60 "
Lucerne	60 "

If the reader will trust to the experience of the writer, he will find it hardly worth his while to go beyond the list of grasses described in this Essay. Full trial has been made of more than twenty other species of grass cultivated in Europe and at the North, without success.

AFTER-TREATMENT OF GRASS LAND.

Fatal errors are often committed in the management of lands in grass. As soon as the young grass is green in the spring, live stock is turned upon it; whereas grass should not be grazed until it has once gone to seed, and in subsequent years only after it is nearly in blossom. Too much stock should at no time be put upon it as to graze it close to the ground, Bermuda and blue-grass being exceptions.

A thin growth of the annual grasses and weeds is not injurious to newly sown grass lands, but is rather beneficial, shading the young grass from the sun. But lands sufficiently rich to give a vigorous growth of the artificial grasses, is also apt to produce a rank growth of crab grass and weeds. If these are suffered to mature, the young grass will be smothered. They should be mowed as soon as they are tall enough for the scythe, and this mowing must be repeated as often as necessary, to keep down the rank growth. And if in

the fall, the young grass kept back by these weeds should be hardly visible, it must not be concluded that there has been a failure; wait until the spring and then determine whether it is best or not to put in some other crop.

MANURES FOR GRASS LAND.

The best manure is farm-yard manure. Where the supply of this is limited its value may be increased by composting it with rich earth from ditches, woods-mould and ashes; or the quantity of manure may be increased by composting commercial or chemical manures with the same materials. It should be remembered that ammonia and potash are the dominant wants of the grasses, and phosphate of lime of the clovers and lucerne.

This compost applied in the winter is valuable not only on account of the manure, but especially for the mulch that is given to the young grass, protecting it from the severity of the winter and the intense heat of summer. Indeed, if the land be sufficiently rich to cause a full stand of grass, this subsequent top-dressing is really more valuable than if the manure had been incorporated with the soil at the time of sowing. This top-dressing should be applied only in dry weather.

If no stock is allowed to graze a meadow after it has been cut until toward Christmas, and if the meadow consist of grasses which bear a full aftermath, as in the case with orchard, meadow-oat and blue-grass, and if the stock grazing it are not removed at night, such a meadow will continue to improve. This is not the case with a Timothy and Herd's grass meadow, as they leave very little second growth or aftermath. They should receive a top-dressing at least every three years. If the farm does not produce the manure, the farmer should buy it. An acre of land that will yield two tons of hay worth $60, well deserves a triennial application of $10 worth of purchased fertilizer. It will pay better than the same application to cotton land, taking into the account the cost of culture.

The cheapest manure for grass land is water by means of irrigation. But the limits of this little Manual will not allow a detailed account of this cheap and important process The reader who is interested in it is respectfully referred to a Prize Essay on that subject by the writer, which was published in the *Plantation*, Atlanta, 1871.

WHETHER TO SELL HAY OR TO FEED IT.

This depends upon our locality and the price we can get for our hay. If hay sells for $30 or $35 per ton, a farmer who lives near a market would be very foolish to feed that hay to cattle, provided he will invest a portion of the proceeds of the hay in chemical or commercial fertilizers. In our mild winters a cow will eat five hundred pounds of hay, and much more if it be given to her. But after the run of the fields five hundred pounds of hay will sustain her until grass springs. This five hundred pounds of hay would sell for six or seven dollars. If we deduct trouble of housing and hauling, the manure of this cow is not worth the six or seven dollars. If she be fed on winter pastures, that is another affair. The question now is between the value of a given amount of hay, merchantable at a given price, and the valueof a winter's manure of a cow. Six or seven dollars, worth of a suitable fertilizer will go furher in improving a meadow than the manure of one cow, unless extraordinary expense is incurred and care bestowed in providing litter, muck and tanks for liquid manure. But in determining this question of comparative profit, it must be quite certain that the man who sells the hay buys the six or seven dollars' worth of fertilizer. If he does not, it will be better for him to feed his hay, no matter what price it will bring in market, for his meadow must have manure.

It is very clear that if we take more from land than we give to it, we are ripping up the goose. A very small leak will empty a barrel in time, unless we continue to pour into it. A crop of hay takes so much of a variety of salts from the ground. If we do not return an equivalent, our crops will annually diminish. If we wish them to increase, we must return more than an equivalent. This is only common sense.

This comparison is made only as to the value of the manure of the domestic animals when fed with hay. There may be a special value in beef or butter, or in mule or horse colts which would modify it. It is important not to be misunderstood. When hay is at a high price and the market is near, it is cheaper to spend some of the hay money for manure than to trust to the cow fed on hay simply as a manure-making animal.

It is not designed to decrease the number of horses, cattle or sheep, but to point to the fact that hay at present prices is too expensive a food to feed them with when they can be fed much more cheaply, and that is by means of winter pastures, which cost nothing after the first outlay, and continually improved by judicious grazing.

The present prices of hay, $30 to $35, will probably continue for a long time in the plantation States. Under our former system the planter could pull an excess of fodder and sell it at a small profit at $1 per hundred pounds. Now if he sold fodder pulled by our present hired labor at $30 per ton, it would be a losing business.

There are a vast number of horses and cows in our cities and elsewhere belonging to non-producers, which consume bought forage. This number is yearly increasing with the increase of our non-producing population.

The supply of forage for this live stock has heretofore been brought by rail from the West. On account of the cost of freights, the Western farmer cannot lay down hay in our cities at less than present prices. There is, therefore, no reasonable expectation that the price of hay will materially diminish. At the present prices, to one living near a railroad or a market, the profits are enormous.

Let us take a case. Lucerne will grow anywhere in the South where the land is not too sandy, is dry, and is made very rich. Five tons of lucerne hay to the acre is not an unreasonable estimate, but we will say four tons. This at $30 per ton, is $120 per acre.

Now suppose a man buys one hundred acres of land—it may be old broom-sedge with a good clay foundation, near a good hay market—at $10 per acre, $1,000. Suppose that it costs him $40 per acre to plough, harrow, roll, seed, and manure this land. His investment will have been $5,000. At four tons per acre, worth $30 per ton, his crop will bring him $12,000; that is to say, $12,000 grass is obtained from an investment of $5,000. There is nothing speculative or theoretic in these figures. Every one who knows anything about it, knows that four tons to the acre is a small yield for lucerne. If there be an error, it is in the under-estimate. Any one who reads the prices-current of our newspapers also knows that the price quoted above is correct. It should be borne in mind that the $5,000 investment is only for the first year. After that the $12,000 will be obtained with only the cost of a triennial top-dressing and the cutting and saving the crop, which with improved implements is less than $2 per ton. What cotton or rice planter approximates these results?

But it is said, perhaps, with a sneer, "We are poor? None of us have $5,000 to invest in one hundred acres of grass." Yes, you have, if you are a cotton planter to any extent. Sell a dozen of your mules, that have been annually eating their heads off since the war—the Southern mule being like a cat with nine lives. Sell the corn and fodder that would feed them for a year, or save the money that would buy it. Estimate the annual cost of the twelve hands which would be necessary to work the twelve mules, and if you have the land already, you will have saved money enough for the one hundred acres of lucerne.

One hundred acres has been selected as a definite figure. Of course the amount of land can be diminished according to the ability of the party concerned.

In this calculation lucerne has been selected, as four tons per acre is an under-estimate. Both clover and Timothy have yielded that amount under high culture.

It is not at all the design of the writer to propose grass of any kind as a substitute for cotton, which would be preposterous. But it is his purpose to urge the diminution of the area planted in cotton, to impress the necessity of a diversification of our products, and the wisdom of getting the benefit to ourselves of these high prices for hay while they last, which must be for a number of years. We want a cotton crop, a wool crop, a butter and cheese crop, a grain crop, and a hay crop. We want all of these to a greater or less extent, according to circumstances, on a single plantation. This is, of course, impossible with what we call a full crop of cotton, which requires all hands all the year. But it is possible where cotton is as it should be, one constituent of a four or five years' rotation.

IMPROVED IMPLEMENTS FOR SAVING HAY.

When land has stumps in it, or rocks upon the surface, these improved implements cannot be used. In such cases the grass must be cut with a scythe. Where it is possible without too great expense, these obstructions should be removed, as the cost of saving a crop of hay is greatly reduced by the use of these implements. These implements are the horse-mower, tedder, rake, and hay-lifter, and loader. With their aid the grass is not touched by hand, either in cutting, curing, or housing. The saving of human labor is more than one-half. The cost is diminished more than one-half. The rapidity with which the work is done enables us to command the weather. At the South the saving of human labor is a great object, as it is very difficult to obtain at harvest time. Any one having ten acres of meadow should provide himself with these implements. The saving annually will be a large interest on his money. This is true where skillful mowers can be obtained. At the South they are very rare. It is seldom that a good cradler is a good mower, as the movement is entirely different.

The cost of a light two-horse mowing machine is from $100 to $120; a hay-tedder, $80: sulky horse-rake, $35; say in all, $250. If we allow fifteen per cent. for interest and repair, this would amount to $37 50. Much more than this sum would be saved annually on saving the hay crop of ten acres of meadow.

RAISING GRASS SEED FOR SALE.

The amount of money spent for Northern grass seeds at the South is very large. Last year two seedsmen in Atlanta sold during the season from $75 to $100 worth of clover and grass seeds daily. In the small village of Cartersville $5,000 was expended in one season for clover seed alone. The consumption is increasing every year. There is no good reason why we should not raise our own grass seeds and supply our own dealers. At present prices the profits would be large. But little labor and expense attends the process. As an illustration, the writer saved this year

the seed from a little more than an acre of meadow-oat grass. The yield was six bushels. This at five dollars per bushel, the usual price, would amount to thirty dollars. The grass was cut with a cradle and bound, and was threshed with a flail. The hay was saved, as the seed of this grass ripens while the stalk is green. Southern farmers should stop this leak from the agricultural income of the South. Besides the direct money saving, it would be best to use acclimated grass seeds.

WOODS PASTURES.

Most of our woodland is, to a certain extent, dead capital. This is not the case where woodland rises sufficiently in value to pay a fair interest on the investment, or so far as necessary fence-rails and fuel are concerned. In some of the older portions of the South there is not sufficient timber for the wants of the farm; but there are vast tracts of timber land in other portions which do not appreciate perceptibly in value, and which are comparatively useless. Woods pastures which correspond to the English parks, would in such localities be found very profitable. The timber should be thinned out, leaving the trees thirty to fifty feet distant from each other. Crooked and worthless timber should be cut, leaving rail and mast-bearing trees. Everything that is cut down should be piled and burned in as small heaps as possible, to allow the ashes to be more readily scattered. There is very little of our upland which is rich enough to bring good grass without assistance. The scattered ashes will stimulate the young grass. We have vast quantities of bottom land rich enough to bring good grass, but these are suitable only for summer pastures. They would be poached and damaged by the feet of cattle in the winter. We labor under no deficiency of summer pastures—it is winter pasture that we most need. For this we must depend on our upland, unless during a very dry season on bottom land.

After the ground is prepared by cutting down, burning and scattering the ashes, it should be harrowed, so as to simply loosen the surface. If ploughed, the plough will turn up tussocks and lumps, and if these are turned back again on the grass seed after it is sown, they will fail to vegetate. If sown after the ground is loosened, before a rain or during a drizzle, no covering is necessary. If in a dry time a light brush is sufficient. Or if the pasture be small, and the stock of cattle or sheep be large, penning them and driving them about for a few days will pack the seed into the ground without inverting any of the sods or tussocks. The grass seeds recommended for winter pastures would be sown on this land, and treated as prescribed for them.

Woods pastures or parks thus formed will convert dead into living capital. We now pay taxes on our woodland; it should pay us something in return. A woods pasture is a great relief to the corn-crib in raising hogs. Trees trampled around and thinned rarely fail in bearing mast. This, in connection with the grass, will nearly fatten a large amount of pork.

They are also a great saving in the way of shelter. While it is a cruelty to confine stock in a bare lot without shelter, in a woods pasture in our climate they really do not need shelter. This is especially the case where they can have access to a south hillside. On such spots it is always well to leave a thicket for shelter.

Scarcely any improvement would add more to the value of our landed estate than woods pastures or parks. Nothing would add more to its beauty. The parks of England are one of its chief ornaments—an ornament which is also an utility. Fine oaks, green grass, running water, and blatant sheep or lowing cattle, form a landscape which the painter attempts in vain adequately to depict. There is no reason why a large portion of the neglected woodland of the South may not be made to add to our wealth, while it fills the eye with scenes of beauty.

NUTRITIVE VALUE OF THE GRASSES.

The following tables will be read with interest. They were prepared by Prof. Way, Chemist of the Royal Agricultural Society of England. Wherever the examination of these tables is not instructive, referring as they do to a number of grasses not in use among us, they will at all events gratify commendable curiosity. In these tables, a distinction is made to which we are not accustomed. The grasses are all called natural—those which we term "forage plants," are called artificial grasses, as clover, etc.

These tables will be readily understood by the unscientific reader, if he will remember, that Albuminous matters are those which produce flesh, that fatty matters are the fat forming principles, that the heat producing principles, include all others besides those which form flesh, fats or woody fibre, and that the ash includes all the mineral matter which is left after burning, as phosphate of lime, potash, etc., all of which the plant has taken from the soil. These valuable tables deserve other explanatory comments. But these comments would carry us beyond the limits of a merely popular manual for the unscientific reader. Those who are disposed to pursue the subject further are referred to Flint's admirable work on the Grasses, published by Crosby, Nichols & Lee, Boston, Mass.

ANALYSIS OF NATURAL GRASSES. (100 PARTS AS TAKEN GREEN FROM THE FIELD.)

NAMES OF GRASS.	Water.	Albuminous, or Flesh Forming Principles.	Fatty Matters.	Heat producing Principles, Starch, Gum, Sugar, etc.	Woody Fibre.	Mineral Matter or Ash.
Sweet-scented Vernal	80.35	2.05	0.67	8.54	7.15	1.24
Meadow Foxtail	80.20	2.44	0.52	8.59	6.70	1·55
Tall Oat Grass	72.65	3 54	0.87	11.21	9 37	2.36
Yellow Oat Grass	60.40	2.96	1.04	18.66	14 22	2 72
Downy Oat Grass	61.50	3.07	0.92	19.16	13.34	2.01
Quaking Grass	51.85	2.93	1.45	22.60	17.00	4.17
Upright Brome Grass	59.57	3.78	1.35	00.33	19.00	2.11
Soft Brome Grass	76.62	4.05	0.47	9.04	8.46	1.36
Crested Dogstail	62.73	4.13	1.32	19.64	9.80	2.38
Orchard Grass	70.00	4.06	0.94	13.30	10.11	1.59
Orchard Grass, seeds ripe	52.57	10.93	0.74	12.61	20.54	2.61
Hard Fescue Grass	69.33	3.70	1.02	12.46	11.83	1.66
Meadow Soft Grass	69.70	3.49	1.02	11.92	11.94	1.93
Barley Grass	58.85	4.59	0.94	20.05	13.03	2.54
Perennial Rye Grass	71.43	3.37	0.91	12.08	10.06	2.15
Italian Rye Grass	75.61	2.45	0.80	14.11	4.82	2.21
Timothy Grass	57.21	4.86	1.50	22.85	11.32	2.26
Annual Spear Grass	79.14	2.47	0.71	10.79	6.30	0.59
June Grass	67.14	3.41	0.86	14.15	12.49	1.95
Rough-stalked Meadow	73.60	2.58	0·97	10.54	10.11	2.20
Irrigated Meadow Grass	87.58	3.22	0.81	3.98	3.13	1.28
Irrigated Meadow, 2nd crop	74.53	2.78	0.52	11.17	8.76	2.24
Annual Rye Grass	69.00	2.96	0.69	12.89	12.47	1.99

ANALYSIS OF NATURAL GRASSES. (100 PARTS OF THE GRASSES DRIED AT 212° FAHRENHEIT.)

NAME OF GRASS.	Albuminous or Flesh Forming Principles.	Fatty Matters.	Heat producing Principles, Starch, Sugar, Gum, etc.	Woody Fibre.	Mineral Matter or Ash.
Sweet scented Vernal Grass	10.43	3.41	43.48	36.36	6.32
Meadow Foxtail	12.32	2.92	43.12	33.83	7.81
Tall Oat Grass	12 95	3.19	38.03	34.24	11.59
Yellow Oat Grass	7.48	2.61	47.08	35.95	6.88
Downy Oat Grass	7.97	2.39	49.78	34.64	5 22
Tucking Grass	6.08	3.01	46.95	35.30	8.66
Upright Brome Grass	9.44	3.33	82	02	5.21
Soft Brome Grass	17.29	2.11	38.66	36.12	5.82
Crested Dog's-tail	11.08	3.54	52.64	26.36	6.38
Orchard Grass	13.53	3.14	44.32	33.70	5.31
Orchard Grass, seeds ripe	23.08	1.56	26.53	43.32	5.51
Hard Fescue Grass	12.10	3.34	40.43	38 71	5.42
Meadow Soft Grass	11 52	3.56	39.25	39.30	6.37
Meadow Barley Grass	11.17	2.30	46.68	31.67	6.18
Perennial Rye Grass	11.85	3 17	42.24	35.20	7.54
Italian Rye Grass	10.10	3.27	57 82	19.76	9.05
Timothy	11.36	3.55	53.35	26.46	5 28
Annual Spear Grass	11.83	3.42	51.70	30.22	2 83
June Grass	10.35	2.63	43.06	38.02	5.94
Rough Stalked Meadow	9.80	3.67	40.17	38.03	8.33
Irrigated Meadow Grass	25.91	6.53	32.05	25.14	10.37
Irrigated Meadow (second crop)	10.92	2.06	43.90	34.30	8.82
Bermuda Grass	12.00	Rave	nel.		6.50

ANALYSIS OF ARTIFICIAL GRASSES. (100 PARTS AS TAKEN FROM THE FIELD.)

NAME OF PLANT.	Water.	Albuminous or Flesh Forming Principles.	Fatty Matters.	Heat producing Principles, Starch, Gum, Sugar, etc.	Woody Fibre.	Mineral Matter or Ash.
Red Clover	81.01	4.27	.69	8.45	3.76	1.82
Perennial Clover	81.05	3.64	.78	8 04	4.91	1.58
Crimson Clover	82.14	2.96	.67	6 70	5.78	1 75
Cow Grass	74.10	6 30	.92	9 42	6.25	3.01
Cow Grass, second specimen	77.57	4.22	1.07	11.14	4.23	1 77
Hop Trefoil	83.48	3 39	.77	7.25	3 74	1 37
White Clover	79.71	3 80	.89	8.14	5.38	2.08
Common Vetch	82.90	4.04	.52	6.75	4.68	1.11
Sainfoin	76.64	4.32	.70	10.73	5.77	1.84
Lucerne, or Alfalfa	69.95	3.83	.82	13.62	8.74	3 04
Black Medick, or Nonsuch	76.80	5.70	.94	7.73	6.32	2.51

ANALYSIS OF ARTIFICIAL GRASSES, (IN 100 PARTS OF THE GRASS DRIED AT 212° FAHR.)

NAME OF PLANT.	Albuminous, a Flesh Forming principles.	Fatty Matters.	Heat Producing Principles, Starch, Gum, Sugar, etc.	Woody Fibre.	Mineral Matter or Ash.
Red Clover	22.55	3 67	44 47	19.75	9.56
Perennial Clover	19.18	4 09	42.42	25 96	8.35
Crimson Clover	16.60	3.73	37.50	32.39	9.78
Cow Grass	24.33	3 57	36.36	24 14	11 60
Cow Grass, second specimen	18.77	4.77	49.65	18.84	7.97
Hop Trefoil	20 48	4.67	43.86	22.66	8 33
White Clover	18.76	4.38	40.04	26.53	10.29
Common Vetch	23.61	3.06	39.45	27 38	6.50
Sainfoin	18.45	3.01	45.96	24.71	7 87
Lucerne, or Alfalfa	12.76	2.76	40.16	34.21	10.11
Black Medick	24.60	4.06	33.31	27.19	10.84

SUGGESTIONS AS TO THE SELECTION OF A GRASS OR STOCK FARM.

There seems to be little to choose as to climate. At the South in each of the plantation States we have three different climates—that of the mountains, the interior and the coast. For live stock the mountains have the advantage in summer, the low country in the winter, while the middle country has a share of advantages and disadvantages of both, without the special excellencies or defects of either.

As a general rule a clay soil is best suited to growing good grass. A soil with a good deal of sand may, however, by manuring, be made to yield very good grass. A piece of worn and unmanured sandy land will produce a light crop of crab-grass ; the same soil well manured will produce a heavy crop of that grass. The soil that will yield a heavy crop of crab-grass will be pretty certain to produce a good crop of other upland grasses. Still, other things being equal, the clay soil is to be preferred.

The lands most likely in the judgment of the writer to produce heavy crops of Timothy and Herd's grass hay, are the rice lands of the coast. They are very rich, and have ample command of water. If the rice planters would apply to their land the agricultural system of Lombardy, they would attain a value of which they have not dreamed. Do they know that the Marcite, or lands in grass irrigated in winter near Milan, rent for from $60 to $100 per acre, while hay sells at $10 per ton ?

After the rice lands, the best meadow lands of the South have been as yet almost wholly untouched by the ax or plow. Reference is made to the immense bodies of bottom land sometimes from five to eight miles wide on our rivers, after they pass from the rolling lands into the flat country. These lands are sufficiently rich, sufficiently moist, and are usually of a compact nature. Being too low for cultivation in cotton and corn, they have been left uncleared. They are worth now generally not more than one dollar per acre—converted into meadow they would pay a heavy interest on $200 Where they are not within reach of railroads the hay can usually be taken cheaply to market by steamer or flat-bottomed boats. The wealth of the South is to be largely increased from this now useless source.

Nothing is said of the range portions of the South, because where there is an exclusive reliance upon the range, nothing but range stock can be sustained. The object of this Manual is to give suggestions as to the rearing of good live stock and the cultivation of good grass for hay or pasture.

If hay is the chief object, proximity to market or river or railway transportation is a material object. If summer and winter pasture is the leading feature, proximity to market is not so important, as stock can be cheaply driven.

Upon grass farms sheep and cattle are the most profitable stock. Colts and hogs require too much grain.

A level surface of upland, without running water, with an excess of sand, is the most unsuitable for a grass farm, and of course for stock-raising.

The perfection of a grass farm, so far as natural requisites are concerned, are enough bottom land to yield the meadow hay that is required for sale or consumption, enough level land to meet the home necessities of grain, and also for lucerne, and the rest rich broken land. In our climate the steeper the hills of our pasture lands the better, provided they may be rich. The reason of this is that in summer the grass will be exposed to the sun only a portion of the day, and in winter the north hillsides are always most natural to grass, and the south sides give stock a sufficiently warm exposure.

To young men at the South entering upon agricultural life, grass farms offer great inducements. They require so little labor and so little outlay. If a young man begins with exclusive cotton culture, he must buy a number of mules and farm implements. He must lay in a stock of food for his mules and laborers. This requires much ready money or running into debt.

These expenses are largely avoided on a grass farm. If a return must be had the first year, grass seeds can be sown with small grain —the whole expense is then the cost of the grass seed. Afterwards the farm will provide for all its own expenses. The commencement of a stock of sheep and cattle is a trifle as compared with the cost of a number of mules and food for them.

The pleasure of life on a grass farm is incomparably greater than on a plantation devoted exclusively to cotton. The latter exacts our whole time; the former gives leisure for reading, study, and the amenities of social life.

The indolent negro is a constant thorn in the side of the cotton planter. It is not necessary to rise before day to fret at our live stock because they will not eat and grow, or with the grass because it will not shoot up its beautiful green blades in the spring-time. Neither the stock nor the grass quarrel with us at Christmas about wages or their share of the crop, or threaten to carry us before a magistrate.

CONCLUSION.

Sound political economy requires that the South should raise its own horses, mules, sheep, cattle and hogs, and produce its own wool, butter, cheese and hay. When we add

these products to our cotton and rice and sugar, we shall, perhaps, live more independently than any other people in Christendom.

Grass culture is the basis of this independence. It is a dictate of philanthropy, as well as a suggestion of interest, to promote it. If this little Manual, making no display, using no scientific terms, but as popular as simple language could make it, shall have assisted in the most humble manner in the attainment of this end, it will have fully answered the purpose of the writer.

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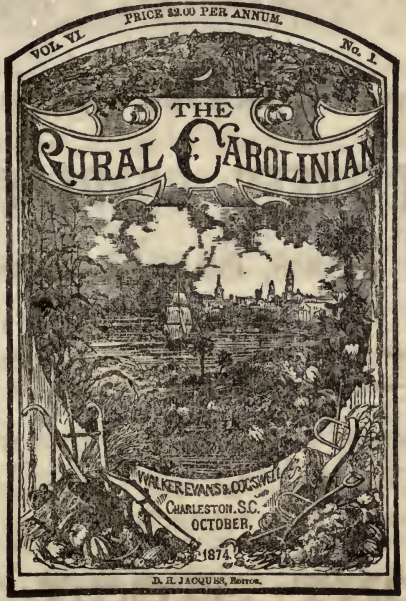

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